

**WORLD DATA CENTER A**  
**Oceanography**

U.S. DEPARTMENT OF COMMERCE

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**CATALOGUE OF DATA**  
**and**  
**REPORT OF DATA EXCHANGE**  
**1997**

WDCA-OC-98-1

World Data Centers conduct international exchange of geophysical observations in accordance with the principles set forth by the International Council of Scientific Unions. WDC-A is established in the United States under the auspices of the National Academy of Sciences.

**WORLD DATA CENTER A**  
**Oceanography**



**CATALOGUE OF DATA**  
**and**  
**REPORT OF DATA EXCHANGE**  
**1997**

**CHANGE NOTICE NOS. 60 AND 61**  
**(1 JANUARY - 31 DECEMBER 1997)**

**WORLD DATA CENTER A**  
**Oceanography**  
**Silver Spring, Maryland**

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**1998**

## ***ABSTRACT***

This publication lists and describes all data received by WDC-A, Oceanography during the period 1 January - 31 December 1997. It supplements the original six-volume Catalogue of Data, which includes Change Notice Nos. 1-16. It also includes tabulations of data received during 1997 as well as summarizations of data received prior to 1997. The types of data include oceanographic station data, bathythermograph data, current measurements, biological observations, meteorological observations, and sea surface measurements. An Alphabetical Index of ship names and a Geographical Index of ocean areas assist the user in selecting the required data.

The Catalogue of Data and Report of Data Exchange, 1997 is the third in a new series of publications issued yearly by WDC-A, Oceanography. It combines the data information previously presented in WDC-A's Change Notices to the Catalogue of Data and its annual report Oceanographic Data Exchange; these publications are no longer issued separately by WDC-A.

40th Anniversary Issue: In observance of the 40th anniversary of the International Geophysical Year (IGY) and the establishment of the World Data Center system, this issue includes a special section entitled "World Data Center A, Oceanography-A 40-Year History of Service to the International Scientific Community."

**Compiled by**

**Charlotte L. Sazama  
Ronald E. Moffatt  
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SOLID-EARTH GEOPHYSICS  
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TIDES, RECENT MOVEMENTS OF  
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## PREFACE

The six-volume Catalogue of Data and the loose-leaf Change Notice Numbers 1-16, which have been integrated into the Catalogue, list all oceanographic data received by World Data Center A, Oceanography, from July 1957 through June 1975. The Catalogue has a loose-leaf arrangement of sheets, which have been punched for standard three-ring binders. It includes station location charts for many cruises.

Beginning with Change Notice No. 17, each Change Notice is printed in a modified format as a separate, bound publication describing all data received during a particular six-month or one-year period. The six-volume Catalogue of Data, including Change Notice Nos. 1-16, continues to serve as a reference volume for data received from July 1957 through June 1975. Provision has been made in the modified format for correlating newly received data for a particular cruise with data previously received for that same cruise and already described in a prior Change Notice. The capability for identifying those data, which have been machine-processed by a national, regional, or responsible national oceanographic data center, has been retained in the modified catalogue format.

Until recently, data gathered before the beginning of the IGY in 1957 had not been extensively accessioned by World Data Center A, Oceanography; however, numerous international bodies have pressed the WDCs, Oceanography to accession as much historical data as possible, in order to augment the data bases required for support of Climate Research and Global Change Programs. Thus, the acquisition of pre-IGY, as well as post-IGY data, has become a high priority goal for WDC-A. The Catalogue now contains pre-IGY data accessioned by WDC-A and available in automated form to requesters in the international oceanographic community. The Global Oceanographic Data Archaeology and Rescue (GODAR) program has generated significant contributions of historical oceanographic observations from numerous countries.

It should be noted that the designations of countries used in this publication do not imply the expression of any opinion whatsoever on the part of this Center concerning the delineation of the territorial boundaries, the political subdivisions, or the legal status of any country or territory. WDC-A, Oceanography, will make every effort to promptly correct any inconsistency that is brought to its attention.



## INTRODUCTION

The World Data Center system was established in 1957 to collect data from the numerous and widespread observational programs of the International Geophysical Year (IGY) under the principles set forth by the International Council of Scientific Unions (ICSU) and to make such data readily accessible for an indefinite period of time to interested scientists and scholars. The system consists of World Data Center A (WDC-A) located in the U.S.A.; WDC-B located in Russia; WDC-C located in Western Europe and Japan; and WDC-D located in the People's Republic of China. WDC-A is established under the auspices of the U.S. National Academy of Sciences, where the Coordination Office is located. WDC-A is divided into thirteen discipline subcenters whose addresses are given on pages iv and v. These centers are located in institutions which, in the opinion of the Academy, can best serve the interests of science because of their data-handling capabilities for the appropriate scientific disciplines. WDC-A, Oceanography, is collocated with the National Oceanographic Data Center (NODC) in Silver Spring, Maryland.

After completion of the IGY program, ICSU delegated the responsibility for the operation of the World Data Centers to its Comité International de Géophysique (CIG) and subsequently to the ICSU Panel on World Data Centres. The framework for continued international exchange of oceanographic data is set forth in ICSU's Guide to the World Data Center System and the Intergovernmental Oceanographic Commission's (IOC's) Manual on International Oceanographic Data Exchange.

The types of oceanographic data desired for inclusion in the World Data Center system are those from international cooperative expeditions, Global Change and Climate Research Programs, and those associated with various countries' National Oceanographic Programs. Data are to be exchanged internationally in accordance with provisions of the IOC's Manual and the ICSU Guide. Lists of National Oceanographic Programs are compiled by various national committees on oceanography and submitted to the Intergovernmental Oceanographic Commission for dissemination to the international oceanographic community.

Contributors of oceanographic data to the World Data Center system and national committees on oceanography are urged to compare the Catalogue of Data with data gathering cruises and expeditions listed in IOC information documents or on-line information systems to determine whether the cruises actually completed agree with those listed and to ensure that the data resulting from them are transmitted to the World Data Centers in the manner prescribed by the IOC Manual and the ICSU Guide. Data need not be limited to those identified in IOC documents or on-line systems; WDC-A, Oceanography, welcomes all data that fall within the framework of the ICSU Guide and the IOC Manual and that contributors may wish to include in the international marine data base of the WDCs.

## HOW TO USE THE CHANGE NOTICE TO THE CATALOGUE OF DATA

### Catalogue Numbering System

The catalogue numbering system uses groups of numbers and letters to designate identifying references for purposes of data archiving and retrieval. A catalogue number consists of numerals for the assigned: series, country, institution, ship and cruise.

Series — The catalogue numbering system is divided into basic groups called series. At present, these consist of the 100 series for data from ships and other mobile platforms and the 200 series for data from shore and fixed stations in the following categories:

- a. Coastal and island stations.
- b. Near shore manned stations; i.e., lightvessels and platforms.
- c. Offshore manned stations; i.e., ocean weather ships.
- d. Unmanned stations; i.e., automatic buoys.
- e. Stations on shipping routes.
- f. Offshore reference stations visited regularly.
- g. Cables in use for oceanographic observations.
- h. Repetitive drifting observations; i.e., ice islands, drifting buoys.

Country — A list in the Indexes section includes all countries and institutions from which this Center has received data during this period together with their discrete identifying numbers. The series and two-digit country number comprise the first three digits of the catalogue number.

Example: For country number 01, Argentina, data from ships and mobile platforms are catalogued as 101, and data from shore and fixed stations as 201.

NOTE: The designations of countries used in this publication do not imply the expression of any opinion whatsoever on the part of this Center concerning the delineation of the territorial boundaries, the political subdivisions, or the legal status of any country or territory.

Institution — An institution which contributed data, either directly or through its designated national agency or national, regional or specialized oceanographic data center, is assigned a decimal number following the series/country number.

Example: The number 101.01 is assigned to data taken by ships and mobile platforms and received from the Argentine Servicio de Hidrografia Naval, and the number 201.01 is assigned to data taken at shore and fixed stations and received from the same institution.

Ship — Each ship, or in some instances a group of ships operating together, is assigned a letter following the series/country/institution number. The letter is followed by a number assigned to the particular cruise as the data are received.

NOTE: The term “cruise” is used in this catalogue to define, whenever possible, the beginning and ending dates of a series of data collected by a ship, usually identified by the contributing institution with a cruise name and/or number. Sometimes it is necessary to group several series of data from one or more ships together under one catalogue number.

Example: The first cruise data received from the Argentine Servicio de Hidrografia Naval are from the ship CAPITAN CANEPA, which is assigned the letter A, followed by the number 01, thus A-01; the second cruise is A-02, the third A-03, etc. Thus, the catalogue numbers 101.01 A-01, A-02, A-03, etc.

A similar system is used in the 200-series for ships but is not applied to lightvessels and fixed shore stations; for the latter the ship/cruise identifier is omitted. For these categories, the series/country/institution numbers are given, but the lightvessel's or station's name must be added instead of the ship/cruise number to complete the catalogue identification.

Example: The Canadian station at Triple Island is identified as: 206.03 Triple Island.

A shore station is listed under the country in or near whose territory it is located. If observations are carried out and the data contributed by an institution of another country, the observing country's name and institution are listed after the name of the country of location.

### How to Use the Alphabetical Index

1. Look up the name of the ship or fixed station in the Alphabetical Index where the related country/institution/ship catalogue numbers are listed.
2. Look up, under the respective countries, the indicated Catalogue Numbers.

### How to Use the Geographical Index

1. Obtain the geographic area number and name from the Geographical Index Charts.
2. Look up the list of catalogue numbers of available data for the area in the



## Geographical Index.

3. Use these catalogue numbers to locate information about the types and amount of data available.

### How to Obtain Data from WDC-A, Oceanography

When communicating with the Center for additional information concerning data, the requester should, where possible, refer to the specific catalogue numbers for data of interest. The catalogue numbers are designed to facilitate the identification and retrieval of the information or data you need.

Address all correspondence to:

Director, World Data Center A, Oceanography  
National Oceanic and Atmospheric Administration  
Silver Spring, MD 20910-3282 U.S.A.

If you telephone, the numbers are:

The Director: 301-713-3290.  
The Associate Director: 301-713-3295.  
The Data Archives: 301-713-3295.  
FAX: 301-713-3303  
E-mail: wdca@nodc.noaa.gov

If you wish to visit the Center, its office hours are from 6:30 a.m. to 3:30 p.m., Monday through Friday. The Center is not open on Saturdays, Sundays, and U.S. national holidays. If you wish the use of study space, you should, if possible, give the Center advance notice so that necessary arrangements can be made. There is no charge for the use of study space.

### Data Exchange Policy of World Data Center A, Oceanography

World Data Centers are held responsible for the provision of data and information to qualified requesters in the scientific community either in exchange or at a cost not to exceed that of processing and shipping. Unless a requester specifies otherwise, the Center is responsible for using the method which most satisfactorily reproduces the data or information item at the least cost. For certain types of requests, limitations in funding, personnel, or facilities may preclude direct or free provision of data or information by the World Data Center.

Data exchanges between WDC-A, Oceanography and WDC's in the same discipline usually take place without charge for routine exchanges of mutually agreed-upon types of data received by WDC-A in internationally-approved data



exchange formats and in readily reproducible media forms. Non-standard data types are not normally exchanged. The ICSU Panel has now recognized that it is not always economically feasible to copy large data sets from one WDC to another. For certain types of data, the exchange of inventories of available data in a WDC subcenter may be considered acceptable in lieu of the transfer of the actual data sets.

In general, reasonably-sized requests from national or regional contributors to WDC-A, Oceanography may be considered as exchange, and equivalent data thus provided to the requester without charge. For requests for unusually large amounts of data, for specially formatted data, for derived data products, or for data to be obtained from outside the WDC system, WDC-A will normally be required to recover the costs of processing and shipping, or, at its discretion, may arrange for the request to be serviced by an RNO DC or a regional, national, or disciplinary center. WDC-A may serve as an intermediary or coordinator for requests for unique types of data or data in other disciplines by placing the originator of the request in contact with the appropriate institution or disciplinary center.

Normally, WDC-A, Oceanography considers its data exchange commitment with a cooperating Data Center to be limited to the servicing of those requests or routine updating requirements intended to build or enhance standard data bases operated by that Center for specific, mutually agreed-upon data types and geographical areas of national or scientific interest. If the availability of funding and resources permit, WDC-A also attempts to assist such cooperating Data Centers when they require special data sets for institutions that are performing project-related research for international climate and global change programs and/or that have historically contributed data to WDC-A, Oceanography through that Data Center. WDC-A, Oceanography is obliged, in any case, to follow the exchange and cost recovery policies of its sponsoring (funding) government agency, while attempting to maintain consistency with data exchange guidelines of the ICSU Panel on WDC's as published in the ICSU Guide.

Data and information may be requested from WDC-A, Oceanography through NODCs, Designated National Agencies, or any other organization identified by national or international initiatives as responsible for communication with the World Data Centers. These materials may also be requested directly from WDC-A, Oceanography. Organizations, institutions, or individuals from Member States of the IOC may apply to the IOC Secretariat or UNESCO for possible assistance in funding their projects.

Data Centers or institutions in the international community that have acquired an automated data set or specialized data product from WDC-A must be aware that original data sets are updated from time to time, errors corrected, or spurious data deleted by the originating data center. Where duplicate data sets

are deliberately held in this way, the holder is responsible for making regular contact, as required, with the originating center to check whether the old data set is still valid, whether it should be deleted, or whether new data are available. WDC-A bears no responsibility in the conduct of these arrangements, except as regards the provision of information in its role as a coordination and referral center.

#### Acknowledgment of Data Sources

In many instances, data contributed to the Center are unpublished at the time of receipt. Unpublished data are identified in the Change Notice by the absence of a publication number in the column entitled Data Center Reference Number. Accordingly, as stipulated by the Guide, recipients of copies of such data from the Center are reminded that the rights of the original investigators must always be respected. Thus, it is requested that *if any data supplied by WDC-A, Oceanography are published, due acknowledgment be made of the institution (and where appropriate, the principal investigator) which undertook the original observations*. To facilitate proper acknowledgment, the Change Notice indicates the originating institution.

**SPECIAL SUPPLEMENT**

**A 40-YEAR HISTORY OF SERVICE  
TO THE  
INTERNATIONAL  
SCIENTIFIC COMMUNITY**





## **World Data Center A, Oceanography**

### **A 40-Year History of Service to the International Scientific Community**

Ronald E. Moffatt

Associate Director, WDC-A, Oceanography

#### **THE INTERNATIONAL GEOPHYSICAL YEAR (IGY)**

The International Council of Scientific Unions (ICSU) adopted a proposal in 1951 to schedule a third international cooperative scientific effort, comparable to, but on a far more ambitious scale than the First and Second International Polar Years (1882-83 and 1932-33). To coordinate planning for the International Geophysical Year (IGY), ICSU established the Special Committee for the IGY (CSAGI) in 1953; the operational period chosen for this program was 1 July 1957 - 31 December 1958. The IGY was highly successful, with more than 10,000 scientists participating from 67 nations. The oceanography program for the IGY was comprised of two basic components:

- (1) the measurement of sea level at coastal stations, with special emphasis on oceanic island stations; and
- (2) observations made at sea by research vessels.

The underlying purpose was to provide information that could be used to study the earth's heat and water budget, with a view toward improving our weather forecasting, in particular, our long period forecasting.

During the IGY program, a fleet of approximately 70 ships occupied more than 25,000 oceanographic stations. Particular emphasis was placed on the inclusion of synoptic observations. More than 350 tide gauge stations were operated worldwide. Thus, the program was successful not only in terms of international cooperation and participation, but also from the standpoint of the intensity and continuity of the observational program. The success of the IGY, combined with a desire to maintain the excellent spirit of international cooperation that had existed during IGY, led CSAGI to designate 1959 as the year of International Geophysical Cooperation (IGC). Perhaps the greatest legacy of the IGY program, however, came about as the result of a significant shortcoming that had been identified with the data that were observed during the International Polar Years. Many of the long-term benefits that could have been realized from utilization of data observed during the Polar Year Surveys were lost to the scientific community because of the difficulties experienced in obtaining data from originators; this was due in large part to the lack of a systematic scheme for making the data available to the community (1).

It was the stated intention of the Committee that these IGY data sets should serve as "a common fund of knowledge open to all" (2). To achieve this, CSAGI made detailed arrangements for assembling and disseminating the IGY data, and stipulated that data to be exchanged in accordance with IGY guidelines must be available to scientific institutions in all countries. To facilitate these arrangements internationally, CSAGI established the World Data Center (WDC) system. The system was considered to be international in the sense that the centers were intended to serve all countries and all scientific bodies.

## THE WORLD DATA CENTER SYSTEM

### Arrangements and Guidelines

A special CSAGI Conference on WDCs was held in 1957 to formulate recommendations for operation of the WDCs in accordance with the original resolution, which called for systematic exchange and international availability of the data. At this meeting, general plans for operation, as well as specific data exchange arrangements (quantity, format, frequency of reporting, schedules for transmission of data, etc.) were established. These agreements, together with subsequent amendments, were set forth in the **CSAGI Guide to IGY World Data Centers** (2), which also contained individual chapters on specific disciplines, including oceanography. In order to ensure against catastrophic destruction of a single center, and to meet the geographical convenience of, and provide easy communication for, scientists in different parts of the world, two Centers (and sometimes three) were established for each discipline, with both Centers holding duplicate data sets. The basic principles for operation of the WDCs as laid down by CSAGI were:

1. Each WDC is required to collect data in accordance with the specific chapter in the CSAGI Guide relating to its discipline;
2. Each WDC must agree to exchange data according to the conditions outlined in the Guide. In particular, the WDCs shall interchange data among themselves by discipline in accordance with the Guide and at no charge;
3. Each WDC is required to supply data (at a cost not to exceed the cost of copying and postage) at the request of scientists or scientific institutions in any country; and
4. Each WDC must be freely open to visitors and guest workers from any nation participating in CSAGI programs, and all data in the Center shall be accessible to such visitors and workers.



The WDC concept was remarkably successful in stimulating the flow of IGY and IGC data internationally. In many cases, data that had been previously unavailable for exchange were provided to the WDCs, and, in others, countries not previously exchanging data became actively involved in the flow of data. Also, data from widely distributed stations were made available in one location under the WDC arrangements, and interdisciplinary research studies were greatly facilitated. In many cases, the research would have been impractical or inconclusive without the data collections of the WDCs (3). Thus, upon its termination in 1959, CSAGI strongly recommended that the WDCs continue to collect, exchange, and make available to the scientific community data from the various geophysical disciplines on a permanent basis.

### **International Geophysical Committee**

At the end of the IGY, ICSU established the International Geophysical Committee (CIG), and assigned it the responsibility for the orderly termination of IGY activities and publications and for the efficient operation and continued utilization of the WDCs. CIG strongly endorsed the recommendations of its predecessor, CSAGI, concerning the guidelines and procedures for continued operation of the WDCs. In regard to the IGY publications, CIG assumed a major role in coordinating the completion of the final Catalogue of IGY Data for each discipline, as well as the preparation of other material by the discipline centers for inclusion in the **Annals of the IGY**. The final deadline for receipt of IGY/IGC data to be included in the data catalogues of the WDCs and the **Annals of the IGY** was decided by CIG to be 1 December 1961. Also, citing the need to emphasize utilization of the newly-assembled data bases of the WDCs, CIG formally characterized the two-year period 1 January 1960-31 December 1961 as the "IGY-IGC Analysis and Theoretical Research Period". In accordance with its charge to periodically review the status and required guidelines for data exchange, CIG published the **Guide to International Data Exchange through the World Data Centers for the Period 1960-onwards** in November 1963 (4), followed by the **Provisional Guide for Exchange of Oceanographic Data** (Supplement No. 1 to the Guide, December 1964) (5), which was jointly prepared by ICSU's Scientific Committee for Oceanic Research (SCOR) and a Working Group of the Intergovernmental Oceanographic Commission (IOC).

### **ICSU Panel on World Data Centers**

ICSU decided to terminate CIG effective at the end of 1967. In view of this development, the CIG Bureau formed a Steering Committee for the World Data Centers; its purpose was to consider the present operation of the WDCs, as well as their future role in international data exchange. In September 1968, the Panel on World Data Centers was formally established by ICSU. As the mechanisms for international data exchange were by now fairly well established, the Panel's main responsibilities were to provide advice on the management of the World Data Centers and to issue consolidated guides (and individual discipline

supplements) for data exchange as required. It was intended that the Panel serve as the permanent international non-governmental body with responsibility for approving data exchange procedures.

The Panel's first meeting was held in August 1971; its most pressing task was the revision of the 1963 CIG Guide, which by now had become obsolete. In December 1973, the Panel published the **Third Consolidated Guide to International Data Exchange through the World Data Centres** (6). Due to the significant variations in data exchange procedures among the different discipline centers, the Panel increasingly relied upon the related international scientific bodies and unions for preparation of the individual disciplinary guides. Emphasis was placed on the host country's continued responsibility for guaranteeing the effective collection, storage, reproduction, distribution, and safekeeping of each center's data holdings, as well as providing visiting scientists with the opportunity to work directly with materials stored in the center. It was also recognized by the Panel that for some of the new international data-intensive programs that result in large quantities of data, it might in certain cases be desirable for the WDCs to receive only a description of the data, as well as information about where the data are stored and how they might be made available to potential investigators.

In June 1979, the Panel published the **Fourth Consolidated Guide to International Data Exchange through the World Data Centres** (7). In issuing this Guide, the ICSU Panel:

...reaffirmed the principle that the World Data Centres exist for the benefit of the world-wide community of scientists. Research scientists everywhere are not merely permitted but are warmly invited to make use, not only of the vast store of data in the WDCs, but to avail themselves of the various supplementary services of one kind and another which some of the Centres are able to provide.

Subsequent to this, recognizing the urgent need for the provision of significant modifications to data exchange procedures reflecting the increasing utilization by the Data Centers of modern techniques for handling large data sets, the ICSU Panel, in November 1987, issued the **Guide to the World Data Center System, Part 1, the World Data Centers (General Principles, Locations and Services)** (8). The new Guide covered in some detail the concept of the WDCs, information on the 27 individual discipline subcenters, and information on international data services outside the WDC system.. It was intended that this Guide be followed by the publication of individual Supplements giving technical details of data exchange for the various scientific disciplines and data management plans for major multidisciplinary programs. The 1987 Guide also included two very significant modifications to the guidelines for data exchange through the World Data Center system:

1. "The provision for duplicating all data sets at different WDCs is obsolete. Communications between WDCs are now fast and effective, good user



services can be provided if catalogs are exchanged regularly, and updates can easily be provided upon request"; and

2. "For more specialized data sets, centralization in a WDC is not always practicable. Generally, the WDCs should know where these data are located, and act as 'referral' centers." (8)

The most recent **Guide to the World Data Center System** (9) may be the last to be printed in traditional form; it has been placed on the World Wide Web, and can be updated electronically. This is highly desirable, since the WDC system is constantly changing due to rapid improvements in technology, in particular, increased utilization of the Internet and CD-ROM capability.

While the WDCs are being asked to respond to the requirements of major new ICSU initiatives in global change, climate, and the environment, that involve new disciplines, use new technology, and have a broader international base, the WDCs must always remain true to the ICSU principle of open, non-discriminatory access to the system by scientists in all countries.

## WORLD DATA CENTERS A, B, C, AND D

### World Data Center A

World Data Center A was established in the United States during the IGY under the auspices of the U.S. National Academy of Sciences, with the WDC-A Coordination Office (located at the Academy) serving as a central coordinating office. Rather than have all discipline subcenters of WDC-A consolidated at one location, the decision was made to co-locate each center with an existing institution that:

- (1) possessed a staff familiar with data for that particular geophysical discipline;
- (2) had national and international contacts in their specialized field; and
- (3) could provide processing, archiving, and servicing support to the WDC-A subcenter.

Funding support was initially provided for all WDC-A subcenters by the National Science Foundation (NSF), as a logical extension of funding provided for the IGY. In the late 60s and early 70s, the responsibility for funding WDC-A centers was assumed by government agencies, such as the Environmental Science Services Administration (ESSA) and its successor, the National Oceanic and Atmospheric Administration (NOAA).

Initially, WDC-A subcenters were established for the following geophysical disciplines: (1) Solar Activity; (2) Airglow and Ionosphere; (3) Aurora (Instrumental); (4) Aurora (Visual); (5) Cosmic Rays; (6) Geomagnetism, Gravity, and Seismology; (7) Glaciology; (8) Longitude and Latitude; (9) Meteorology and Nuclear Radiation; (10) Oceanography; and (11) Rockets and Satellites. Over the years, some discipline centers were combined to form a single subcenter, and new centers were established in response to international initiatives in the geophysical sciences. In some cases, disciplinary names were changed to more accurately reflect recent activities; for example, WDC-A, Longitude and Latitude became WDC-A, Rotation of the Earth. Additions to the list of WDC-A subcenters during recent years include: (1) Atmospheric Trace Gases; (2) Human Interactions in the Environment; (3) Paleoclimatology; and (4) Remotely Sensed Land Data. Currently, there are 13 WDC-A discipline centers operating in the United States under the sponsorship of the U.S. National Academy of Sciences. Policy guidance for the WDC-A centers is provided through the Academy's Committee on Geophysical and Environmental Data; the WDC-A Coordination Office continues to facilitate visits and other activities of the discipline centers.

### **World Data Center B**

World Data Center B was established in the U.S.S.R. during the IGY by the Soviet Geophysical Committee of the U.S.S.R. National Academy of Sciences. World Data Center B1 was located in Moscow and was comprised of the following discipline subcenters: (1) Meteorology; (2) Gravimetry; (3) Nuclear Radiation; (4) Seismology; (5) Oceanography; (6) Longitude and Latitude; (7) Rockets and Satellites; and (8) Glaciology. World Data Center B2, also located in Moscow, included the following centers: (1) Geomagnetism; (2) Ionosphere; (3) Solar Activity; (4) Cosmic Rays; (5) Aurora (Instrumented); (6) Aurora (Visual); and (7) Airglow. A number of years ago, WDC-B1, Oceanography completed a move to Obninsk, Russia, so as to be physically co-located with the Russian National Oceanographic Data Center.

### **World Data Center C**

World Data Center C subcenters were in most cases established at existing observatories or other geophysical institutions located in Western Europe, Australia, and Japan; as finally constituted during IGY, World Data Center C comprised 23 centers located in 21 institutions in eight Western European countries, Japan, and Australia. The five WDC-Cs in Japan (Geomagnetism, Airglow, Ionosphere, Cosmic Rays, and Nuclear Radiation) duplicated WDC-Cs in Western Europe; accordingly, those in Europe were designated WDC-C1, and the corresponding WDC-Cs in Japan were designated WDC-C2. Currently, WDC-C1 includes nine discipline centers in Europe, while WDC-C2 has eight centers in Japan and one in India. There is no WDC-C center for Oceanography.



## **World Data Center D**

World Data Center D was established in 1988 in the People's Republic of China under the auspices of the Chinese Academy of Sciences; WDC-D comprises nine discipline centers. World Data Center D, Oceanography is co-located with the National Marine Data and Information Service (NMDIS) in Tianjin; NMDIS serves as the Chinese National Oceanographic Data Center.

## **Specialized Discipline Centers**

Many of these centers have been in existence since the inception of the WDC system, and for all intents and purposes, have been considered a part of the WDC system, because of the specialized support that they provide to WDCs in specific disciplines. In many cases, the types of data handled by the Specialized Center, although relevant to the particular geophysical discipline, are not normally deposited in the WDC discipline subcenter. Rather, the Specialized Center may provide the WDC with inventories or catalogues of their data holdings or appropriate data products. Centers traditionally providing support to the WDCs, Oceanography are as follows:

1. The Service Hydrographique of the International Council for the Exploration of the Sea in Copenhagen, Denmark has served as a Regional Data Center providing data management and other support;
2. The Permanent Service for Mean Sea Level, located in Birkenhead, United Kingdom, is the Specialized Center for the archival and dissemination of mean sea level data;
3. The International Hydrographic Organization (formerly Bureau), located in Monte Carlo, is the Specialized Center for archival and dissemination of bathymetry data.

## **WORLD DATA CENTER A, OCEANOGRAPHY IS ESTABLISHED**

The IGY World Data Center A (WDC-A), Oceanography was established in 1957 at the Agricultural and Mechanical College of Texas (Texas A&M) located in College Station, Texas. It was chosen because of its excellent standing in the research community, as well as its capability to provide the level of support (staff and facilities) required to manage the oceanographic data from the IGY and publish the IGY catalogues and reports. The first Director of WDC-A, Oceanography was Dr. Dale Leipper, and the Associate Director was Cdr. Jack Lumby, who had for many years worked at the British Hydrographic Office. In reviewing early correspondence of WDC-A, Oceanography, it becomes readily apparent

that Cdr. Lumby was an outstanding choice for this important staff position. Virtually no data exchange guidelines specific to the oceanography discipline existed at this time; thus Cdr. Lumby's data handling experience at the Hydrographic Office, combined with his exceptionally high standing in the European marine science community, ensured that WDC-A, Oceanography would have a significant role in the development of procedures and guidelines for data exchange. In fact, Cdr. Lumby had been the first Chairman of the ICES Sub-Committee for Mechanizing the Index of Hydrographic Data held by the Council, prior to his move to Texas.

This Sub-Committee basically laid the groundwork for all future exchanges of oceanographic data. At the time of the IGY, the two largest collections of oceanographic data in the world were held by ICES' Service Hydrographique and the U.S. Navy Hydrographic (now Naval Oceanographic) Office. The Hydrographic Office had in 1950 introduced a set of formats for utilizing punch cards to process bathythermograph and oceanographic station data. ICES staff (Prof. Ilmo Hela and Mr. Jens Smed) worked closely with Dr. John Lyman of the Hydrographic Office to ensure compatibility of the ICES system with that of the Hydrographic Office. This led to the establishment of a formal data exchange agreement between ICES and the Hydrographic Office. The original agreement specified that ICES would be provided with a complete set of punch cards of ICES data from 1902 through 1956 as published in the Bulletin Hydrographique, and the Navy Hydrographic Office would in return receive from ICES punch cards of data from 1957 onward. By agreement, this commitment was transferred from the Navy Hydrographic Office to the National Oceanographic Data Center (NODC) in 1961; this exchange agreement was the predecessor to the very successful exchange of data that has taken place for so many years between ICES and WDC-A (10).

Both the Hydrographic Office and the Service Hydrographique provided invaluable assistance to WDC-A at Texas A&M in processing the IGY oceanographic data set. The recently-agreed-to data exchange procedures, combined with the very excellent working relationships between individuals at the three institutions, greatly expedited the flow of processed data into the Oceanography Subcenter, thus enabling the Center to discharge its data exchange and reporting responsibilities in a timely manner. In addition to its **Catalogue of IGY Oceanographic Data** and six-monthly supplements, the Center also published the following IGY Oceanography Reports: (1) **Atlas of Track Charts of IGY Cruises**; (2) **Hydrological Observations in the Southern Oceans**; (3) **Oceanographic Observations in the Intertropical Region of the World Ocean during IGY and IGC**; and (4) **Productivity Measurements in the World Ocean**.

In view of ICSU's decision to maintain the World Data Center system for an indefinite period of time, the WDC-A staff at Texas A&M submitted a proposal in 1959 to the National



Science Foundation to receive funding to support the continued operation of WDC-A, Oceanography at College Station, after the IGC had ended; funding was initially provided for the period through 30 June 1960, with subsequent extensions through 31 December 1961 to enable the Center to complete its IGY-IGC tasks.

## NATIONAL OCEANOGRAPHIC DATA CENTER

The U.S. Congress decided as a part of the "Marine Sciences and Research Act of 1959" to establish a National Oceanographic Records (now Data) Center in Washington, D.C.; it was initially intended to be a component of the U.S. Department of Commerce, but ultimately became an administrative component of the U.S. Navy Hydrographic Office on 1 November 1960. "... Shore facilities are urgently required to provide laboratory space for analysis and interpretation of data and to train new oceanographers. An essential part of the shore establishment is the new National Oceanographic Data Center... This Center will make available to the scientific community marine data collected throughout the world." (11) NODC was intended to serve primarily as the central repository for the nation's data; its mission was to acquire, compile, process, and preserve oceanographic data for rapid retrieval, to establish procedures for ensuring that the accuracy and general quality of the incorporated data met accepted scientific criteria, and to prepare data summaries, tabulations, and atlases showing annual, seasonal, and monthly oceanographic conditions. NODC was physically located in the Washington Naval Weapons Plant (now Washington Navy Yard).

The administration of the Center was somewhat unique, in that it received policy guidance on a regular basis from an Advisory Board, which was originally comprised of representatives from the following agencies: (1) Navy Hydrographic Office; (2) Coast and Geodetic Survey; (3) Bureau of Commercial Fisheries; (4) National Science Foundation; (5) Atomic Energy Commission; and (6) National Academy of Sciences (NAS). While the requirement that NODC receive Advisory Board approval for many of its operational activities sometimes proved cumbersome, the Board, through its diverse Agency representation, was often a powerful advocate for NODC's interests. This was especially true as proponents of the Texas A&M location and supporters of a Washington-area location lobbied Congress and NAS during the period in which the decision was being made concerning a proposal that WDC-A, Oceanography be re-located from Texas A&M to Washington, D.C. Initially, sentiment seemed to be in favor of allowing the WDC-A subcenter to remain at Texas A&M, because of their excellent performance in operating the Center during its first four years; however, in accordance with the recommendation of the NAS Committee on Oceanography, it was decided to move the Center to Washington. The Committee reasoned that "... the expense of the continued maintenance of the IGY WDC separately from the NODC cannot be justified indefinitely...". Thus, in a letter dated 19 September 1961 from the National Academy of Sciences, NODC was invited to assume the responsibilities of the WDC-A discipline subcenter for Oceanography.

## WORLD DATA CENTER A, OCEANOGRAPHY MOVES TO WASHINGTON

In March 1962, WDC-A, Oceanography moved from Texas to Washington, D.C. and was co-located with NODC in the Naval Weapons Plant; the Director of NODC, Dr. Woodrow Jacobs, also assumed the Directorship of WDC-A, and Mr. William L. Molo was named Associate Director. The transition from Texas A&M apparently went smoothly; an NODC staff member, Mr. James Churgin (later to be a Director of WDC-A, Oceanography), had traveled to Texas in September 1961 to inventory the data and other materials that were required to be moved. The Center's Archives were subsequently transported to Washington in the "trunk of a 1957 Chevy". At the time of the transfer, WDC-A's holdings included data from more than 25,000 oceanographic stations.

The move to Washington also brought about an additional and far-reaching change. WDC-A's previous affiliation with Texas A&M had placed it in the heart of the academic community; now, its new association with NODC, a government agency, would place WDC-A in a totally different environment. UNESCO's Intergovernmental Oceanographic Commission (IOC), at its First Session in 1961, had recognized the WDCs, Oceanography as focal points for the international exchange of oceanographic data; this action by IOC added important intergovernmental recognition to the WDCs. Specifically, the IOC was charged with recommending "the nature, forms, and methods of exchange of oceanographical data through World Data Centers...". At this Session, the IOC established the Working Group on Oceanographic Data Exchange (now the Committee on International Oceanographic Data and Information Exchange, IODE), an action that was to have a profound (and positive) effect on the data exchange activities of the WDCs, Oceanography.

## INTERNATIONAL AND INTERGOVERNMENTAL RELATIONSHIPS

The First Session of the Working Group on Oceanographic Data Exchange was held at NODC in August 1962; Dr. Jacobs was the Group's first Chairman. Dr. Thomas S. Austin followed Dr. Jacobs as WDC-A Director in mid-1967. Although he relinquished the Directorship of WDC-A, Oceanography to Mr. Molo in January 1970, Dr. Austin's five terms as Chairman of the Working Group on International Oceanographic Data Exchange (1968-1975), combined with his position after January 1970 as Director of NOAA's Environmental Data Service (which administered both NODC and WDC-A), ensured that he would continue to provide leadership in activities of importance to international data exchange. From its inception, the IODE Working Group adopted practices that served to enhance the flow of data into the WDCs, Oceanography. IODE initiatives of special importance to the WDCs were:

- (1) standardizing forms for reporting and coding data;
- (2) supporting the development of NODCs;



- (3) adopting standard formats for automated exchange;
- (4) promulgating National Oceanographic Programs (NOPs) and Declared National Programs (DNPs);
- (5) providing the mechanism for creation of Responsible NODCs (RNODCs), which assist the WDCs, Oceanography with special services; and
- (6) coordinating the management and exchange of data resulting from international cooperative investigations.

IOC's requirement that oceanographic data resulting from IOC-sponsored international cooperative surveys be deposited in the WDCs, Oceanography proved to be an excellent stimulus to the flow of data internationally.

#### SUPPORT TO INTERNATIONAL COOPERATIVE INVESTIGATIONS

The very great success of the IGY led to a flurry of international cooperative data-gathering surveys in the ensuing years. The International Indian Ocean Expedition (IIOE) took place during the period 1 September 1959-31 December 1965. WDC-A, Oceanography assumed major data management responsibilities for this important survey, both for Physical-Chemical and for Biological Data Sets. WDC-A was also heavily involved in the International Cooperative Investigations of the Tropical Atlantic (ICITA) surveys, providing significant data management assistance to NODC, which was the data processing center for ICITA. WDC-A staff also provided support to NODC in preparation of the very comprehensive ICITA data reports for EQUALANT I (February-April 1963), EQUALANT II (August-September 1963), and EQUALANT III (February-March 1964). The Cooperative Investigation of the Caribbean and Adjacent Regions (CICAR) (January 1970-July 1976) represented yet another opportunity for NODC and WDC-A, Oceanography to perform data management services in support of the international community; NODC was the Regional Data Center for CICAR, and WDC-A was the Regional Data Inventory Center.

A number of additional cooperative surveys took place during the 1970s; however, for most of these, NODC's and WDC-A's responsibilities were mainly to provide data management support to other Regional Centers, such as ICES, JODC, WDC-B, Oceanography, etc., and to serve as final archival centers. These included:

- (1) Cooperative Study of the Kuroshio and Adjacent Regions (CSK) (1965-1977);
- (2) Cooperative Investigations in the Mediterranean (CIM) (1969-1975);
- (3) Cooperative Investigation of the Northern Part of the Eastern Central Atlantic



(CINECA) (1970-1978);

(4) Global Atmospheric Research Program (GARP) Atlantic Tropical Experiment (GATE) (May-September 1974); and

(5) First GARP Global Experiment (FGGE) (September 1978-February 1980).

WDC-A served as a formal archive for the International GATE Data Set, and also maintains the FGGE Operational Year (FOY) data base created by NODC serving as the RNODC-FOY. Mr. Molo retired as Director on 30 June 1974; his 12-year tenure as Associate Director and Director encompassed many of the major international cooperative surveys, and data management support to these programs by WDC-A. Oceanography represented a substantial commitment during this period. Mr. James Churgin was named to succeed Mr. Molo in August 1974. Mr. Churgin would hold this position for the next 14 years, a period marked by heavy involvement of WDC-A, Oceanography in a number of data exchange and data management initiatives in support of the IOC's Committee on IODE. This period also paralleled a transition in the international oceanographic community from regional-scale cooperative investigations to the global-scale scientific programs required to support climate research and global change studies.

The Tropical Ocean and Global Atmosphere (TOGA) Program monitored the global atmosphere and the upper layers of the three tropical oceans during the 10-year period 1985-1994. With assistance from NODC and several specialized TOGA Data Centers, WDC-A, Oceanography makes available Subsurface Thermal Data and Sea Level Data, as well as Meteorological, Sea Surface Temperature, and Current Measurement Observations from the TOGA Tropical Atmosphere Ocean (TAO) Array of ATLAS and PROTEUS Moorings. The World Ocean Circulation Experiment (WOCE), another component of the World Climate Research Program, is investigating the role played by ocean circulation in the earth's climate system. Utilizing the assistance of NODC, as well as WOCE Data Assembly Centers (DACs) and WOCE Special Analysis Centers (SACs), WDC-A makes available the full spectrum of WOCE data sets on CD-ROMs produced by the DACs and SACs.

## SERVICE TO THE INTERNATIONAL COMMUNITY

"The assistance rendered by the staffs of the WDCs was warmly praised...it is apparent that the WDC-A data centers are in the hands of dedicated and sympathetic staffs." (12) WDC-A, Oceanography is an integral part of the WDC tradition of service to the Scientific Community. In fact, WDC-A's current staff (R. Moffatt, G. Trammell, and C. Sazama) represents a total of more than 86 years of service to the Center; the staff has been ably assisted by the significant contributions of Rene Cuzon du Rest (1982-1995) and Robert Gelfeld (1985-present) to numerous WDC-A data exchange and data management activities.

WDC-A has always made every effort to provide quality service to all requesters, no matter how large or small the request. Further, the Center has a history of positive responses to data exchange and data management initiatives proposed by international organizations such as the Committee on IODE. Participation in these initiatives has served to advance the overall development of international data exchange, as well as to significantly enhance the data holdings of WDC-A, Oceanography.

### **Report of Observations/Samples Collected by Oceanographic Programs (ROSCOP)**

WDC-A has actively participated in the ROSCOP project since its inception, both as an inventory center and in the provision of expert assistance during several iterations of development of the ROSCOP form. The ROSCOP scheme has served the WDCs, Oceanography in the following ways:

- (1) determining the availability of internationally exchangeable data in advance of their receipt by the data center;
- (2) providing referral service to types of data not routinely exchanged through the WDC system; and
- (3) supplying important information and documentation in support of processing and request servicing by national and regional centers.

### **International Geological/Geophysical Cruise Inventory (IGGCI)**

Prior to the creation of WDC-A, Marine Geology and Geophysics in Boulder, Colorado in 1982, WDC-A, Oceanography had been responsible for the exchange of marine geological and geophysical data. The Center maintained the IGGCI system, which was an inventory describing cruises taking geological samples and geophysical measurements worldwide, and, in 1979 published the **Catalogue of International Geological/Geophysical Cruise Inventory (IGGCI) Sample and Traverse Location Plots** with assistance from NOAA's National Geophysical and Solar-Terrestrial Data Center.

### **International Catalogue of Ocean Data Stations**

WDC-A, Oceanography was one of four "regional" data organizations that assisted the IOC in compiling and maintaining this Catalogue (13), which replaced the IOC publication **Fixed Oceanographic Stations of the World**, published by UNESCO in 1963. In addition to the compilation effort, WDC-A designed, prepared artwork, and printed the pads containing the data forms and 18 chartlets, as a service to the IOC; the updated Catalogue was published by UNESCO in 1975.



## **Global Oceanographic Data Archaeology and Rescue (GODAR) Project**

Commensurate with the change from regional investigations in the 60s and 70s to a trend toward global observational programs in the 80s and 90s, there has been a growing recognition of the corresponding need for large amounts of historical data to support climate research and global change studies. An Ocean Climate Data Workshop, held in the United States in 1992, formally recommended the initiation of an international data archaeology project, as a high priority requirement. Prior to that Workshop, an Oceanographic Data Archaeology Workshop was convened at NODC in September 1990 by Dr. Bruce Parker, who became Director of WDC-A, Oceanography in August 1989 after the retirement of Mr. Churgin in December 1988. The Data Archaeology Workshop set priorities based on geographical and temporal needs of the research community and the need to "rescue" data that were at risk due to possible loss or degradation. Dr. Parker resigned in March 1991; his successor, Mr. Sydney Levitus, became Director of WDC-A, Oceanography in April 1992. Under his leadership, a proposal for a Global Oceanographic Data Archaeology and Rescue Project was endorsed by the Committee on IODE at its 14th Session (Paris, December 1992) and approved at the 17th Session of the IOC Assembly (Paris, March 1993); subsequently, Mr. Levitus was named International Coordinator for the GODAR Project by the IOC. GODAR has been a hugely successful project as regards augmentation of the data bases of the WDCs, Oceanography; this, in turn, has provided the capability for significant enhancement of previous climatologies, atlases, and studies of interannual to decadal variability of the World Ocean.

### **On the Move**

Since its days in the Washington Navy Yard, WDC-A, Oceanography has been required to relocate both its staff and its data and publications archives a number of times within the Washington, D.C. area. Each of these moves has had a very significant impact on operations and services, because of the small size of the WDC-A staff and the magnitude of the data and publications archives that were required to be packed prior to each move. In March 1974, WDC-A moved with NODC to the Page Building Complex on Wisconsin Avenue in Georgetown (while at that location, WDC-A also moved from Page Building 2 to Page Building 1). The next move took place in August 1986, when WDC-A moved to the Universal Building on Connecticut Avenue near Dupont Circle. In January 1996, WDC-A was relocated once again, this time to Building 3 in NOAA's Silver Spring Metro Center complex.

### **WDC-A, OCEANOGRAPHY PUBLICATIONS**

After issuance of the final IGY Catalogues of Oceanographic Data, WDC-A, for several years, continued to utilize the same format to present its descriptions of data available at the Center. Then, in 1967, in response to requests from researchers in the oceanographic



community for the provision of more details about the data, WDC-A published a new 5-volume **Catalogue of Data** in loose-leaf form that also allowed for page-sized track charts. Loose-leaf updates (**Change Notices 1-16**) to the Catalogue were issued on a semiannual basis for data received through June 1975. Subsequently, due to rapidly rising printing costs, as well as the unwieldy size of the greatly expanded loose-leaf Catalogue, the Center again reverted to publication of a bound Change Notice for each annual or semiannual period, as appropriate.

Beginning in 1966, WDC-A issued a **Semiannual Report of Oceanographic Data Exchange**, as well as an annual report entitled **Oceanographic Data Exchange**. These reports summarized the Center's yearly exchange activities as regards receipt of data and marine data inventory forms, and also included tabulations of data and inventory forms held by WDC-A prior to that year. The **Semiannual Report of Oceanographic Data Exchange** was discontinued after 1979. Beginning with 1994, it was decided that combining into a single publication the information contained in the **Change Notices to the Catalogue of Data** with the information contained in **Oceanographic Data Exchange** would enhance the value and utility of both presentations and, in the process, conserve staff resources and save printing costs. Thus, the new **Catalogue of Data and Report of Data Exchange** now replaces the former Change Notice and Annual Report.

In December 1967, WDC-A published the **Catalogue of Accessioned Publications, 1957-1967**; this Catalogue contained a bibliographic listing of scientific publications received by WDC-A, and also included a keyword and an author index. Manuscript was prepared by a non-Federal contractor. **Supplements 1-21 to the Catalogue** were also issued covering publications received by the Center through the end of 1992; at this time, the Supplements were discontinued. WDC-A had issued a special **Catalogue of Accessioned Soviet Publications, 1957-1968** in March 1971.

## THE ROAD AHEAD

"...(The) WDC System has begun to evolve away from being primarily archives of data and serving as distribution centers. Their supporting agencies have begun to fund them to expand their activities, e.g., to undertake data rescue projects, compile global data sets, and produce specialized data or information products." (14) During the past several years, WDC-A, Oceanography, under the guidance of Syd Levitus, has made considerable progress in modernizing its data management procedures. The Center's staff continues to be deeply involved in a cooperative effort with the staff of NODC's Ocean Climate Laboratory (OCL) (which includes WDC-A) in successfully pursuing several major data archaeology and rescue projects, as well as an intensive data rescue effort internally, utilizing historical data from the WDC-A Archives. Excellent examples of this OCL/WDC-A collaboration are shown in

**Results of the NODC and IOC Oceanographic Data Archaeology and Rescue Projects: Report 1** (15). The substantially augmented OCL/WDC-A data bases have enabled the OCL to significantly enhance the spatial and temporal coverage of its World Ocean Databases, which are issued on CD-ROMs, as well as the atlases corresponding to these databases.

Internationally, intergovernmental bodies must continue to insist on the free and unrestricted exchange of oceanographic data. Nations must be made to realize that their research interests do not necessarily end at their borders, but may even extend past regional boundaries; thus, the sharing of data between nations benefits not only the international research community, but the individual nations as well (16).

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## World Data Center A, Oceanography Directors and Staff

Directors*	Associate Directors	Technical Staff**
Dale F. Leipper May 1957-August 1959	John R. Lumby (?) 1957-August 1959	
John R. Lumby September 1959-Sept. 1960	Luis R.A. Capurro July 1960-October 1961	
Dale F. Leipper October 1960-February 1962		
Woodrow C. Jacobs March 1962-June 1967	William L. Molo March 1962- December 1969	Benjamin S. Richmond Senior Staff Oceanographer March 1962-January 1968
Thomas S. Austin July 1967-December 1969		Ronald E. Moffatt Staff Oceanographer August 1966-January 1968 Senior Staff Oceanographer February 1968-Dec. 1969
William L. Molo January 1970-June 1974	Ronald E. Moffatt January 1970-Present	E. Godfrey Trammell, Jr. Staff Oceanographer February 1968-Dec. 1969 Senior Staff Oceanographer January 1970-Present
James Churgin August 1974-December 1988		Charlotte L. Sazama Technical Info. Specialist July 1974-Present
Bruce B. Parker August 1989-March 1991		
Sydney Levitus April 1992-Present		

\* During periods of vacancy, the Associate Director assumed the role of Acting Director.

\*\* Rene Cuzon du Rest (1982-1995) and Robert Gelfeld (1985-Present) made significant contributions to numerous WDC-A data exchange and data management activities.

## Significant Events in WDC-A, Oceanography History

- 1957: The International Geophysical Year (IGY) began, and the ICSU system of World Data Centers was created.
- 1957: Establishment of the IGY World Data Center A, Oceanography at Texas A&M University, College Station, Texas; funding by the National Science Foundation.
- 1958: Data exchange agreement and corresponding IGY data processing arrangements between WDC-A, Oceanography, U.S. Navy Hydrographic Office, and ICES.
- 1959: Recommendation by the Special Committee for the IGY (CSAGI) that the World Data Centers continue to operate on a permanent basis.
- 1959: Publication by the IGY WDC-A, Oceanography of the **Catalogue of IGY Oceanographic Data** and the **IGY Oceanography Reports** (1960 and 1961).
- 1960: Establishment of the National Oceanographic Data Center (NODC) in Washington, D.C.
- 1961: Formal recognition of the WDCs, Oceanography as focal points for international exchange of oceanographic data by UNESCO's Intergovernmental Oceanographic Commission (IOC) at its First Session.
- 1962: WDC-A, Oceanography moves from Texas to Washington, D.C. and is co-located with NODC at the Naval Weapons Plant (now Washington Navy Yard).
- 1967: Publication of the WDC-A, Oceanography **Catalogue of Data** (loose-leaf in 5 volumes).
- 1967: Publication of the WDC-A, Oceanography **Catalogue of Accessioned Publications 1957-1967**.
- 1970: Administrative transfer of WDC-A, Oceanography and NODC from the U.S. Naval Oceanographic Office to the recently-formed National Oceanic and Atmospheric Administration (NOAA).
- 1973: NOAA assumes full funding for WDC-A, Oceanography.
- 1974: WDC-A and NODC relocate to the Page Building Complex in Georgetown (Washington, D.C.).



- 1977: WDC-A discontinues publication of loose-leaf **Change Notices to the Catalogue of Data**; future Change Notices to be issued as bound publications.
- 1982: As part of an internal reorganization of NODC, WDC-A, Oceanography becomes the major component of NODC's newly-created International Programs Branch.
- 1986: WDC-A and NODC relocate to the Universal Building on Connecticut Avenue, near Dupont Circle.
- 1987: The 1987 version of the **Guide to the World Data Centers** eliminates the long-standing requirement that duplicate data sets must be provided to each counterpart World Data Center.
- 1992: Ocean Climate Data Workshop recommends initiation of an international data archaeology and rescue project.
- 1993: IOC Assembly approves Global Oceanographic Data Archaeology and Rescue (GODAR) Project; WDC-A participation will ultimately result in vast increases in the size of its historical data holdings.
- 1993: WDC-A, Oceanography administratively transferred from NODC's Information Services Division to the Ocean Climate Laboratory.
- 1994: Publication of WDC-A's new combined **Catalogue of Data and Report of Data Exchange** replaces former Change Notice and Annual Report.
- 1996: WDC-A and NODC again relocate, this time to NOAA's Silver Spring, Maryland Metro Center complex.

## **WDC-A, Oceanography Publications**

Catalogue of IGY Oceanographic Data (IGY WDC-A, Oceanography, College Station, Texas, July 1959)

Atlas of Track Charts of IGY Cruises (IGY Oceanography Report No. 1, College Station, Texas, August 1960)

Hydrological Observations in the Southern Oceans (IGY Oceanography Report No. 2, College Station, Texas, May 1961)

Oceanographic Observations in the Intertropical Region of the World Ocean during IGY and IGC (IGY Oceanography Report No. 3, Part I - Atlantic and Indian Oceans; Parts IIa and IIb - Pacific Ocean, College Station, Texas, September 1961)

Productivity Measurements in the World Ocean (IGY Oceanography Report No. 4, Parts I and II, College Station, Texas, September 1961)

Oceanographic Vessels of the World (Joint Publication of IGY WDC-A, Oceanography and NODC, Volume I, 1961; Volume II, 1963; Volume III, 1966, Washington, D.C.)

Catalogue of Data (WDC-A, Oceanography, Washington, D.C., 1967; loose-leaf in 5 volumes)

Change Notices No. 1-16 to the Catalogue of Data (loose-leaf updates) (WDC-A, Oceanography, Washington, D.C., April 1968.....May 1976)

Change Notice Nos. 17 and 18 to the Catalogue of Data (bound).....Change Notice Nos. 52 and 53 (bound) (WDC-A, Oceanography, Washington, D.C., January 1977.....December 1994)

Catalogue of Data and Report of Data Exchange 1994-95 (WDC-A, Oceanography, Silver Spring, Maryland, 1996)

Catalogue of Data and Report of Data Exchange 1997 (WDC-A, Oceanography, Silver Spring, Maryland, 1997)

Special Catalogue of Data from the International Indian Ocean Expedition (WDC-A, Oceanography, Washington, D.C., September 1967)

Catalogue of International Geological/Geophysical Cruise Inventory (IGGCI) Sample and Traverse Location Plots (WDC-A, Oceanography, Washington, D.C., March 1979; Published jointly with NGSDC)

Catalogue of Accessioned Publications 1957-1967 (WDC-A, Oceanography, Washington, D.C., December 1967)

Catalogue of Accessioned Soviet Publications 1957-1968 (WDC-A, Oceanography, Rockville, Maryland, March 1971)

Supplements No. 1-21 to the Catalogue of Accessioned Publications (WDC-A, Oceanography, Washington, D.C., June 1969.....November 1993)

Semiannual Report of Oceanographic Data Exchange through 30 June 1966.....30 June 1979 (WDC-A, Oceanography, Washington, D.C., October 1966.....February 1980)

Oceanographic Data Exchange 1966.....1993 (WDC-A, Oceanography, Washington, D.C., March 1967.....December 1994)





PART I  
CATALOGUE INDEXES





## EXPLANATION OF THE ALPHABETICAL INDEX OF SHIPS AND FIXED STATIONS

This index presents in alphabetical order the names of the ships, lightvessels, platforms, and shore stations that are listed on the Data Information sheets.

Ship or Fixed Station — The name of the ship, lightvessel, platform, light-house, shore station, etc. Names of ships and lightvessels are given in capital letters, with lightvessels identified by (LV) after their name. All others not so identified are shore or other types of fixed stations.

Country — The name of the country that used the ship to collect data, or the name of the country in or near whose territory fixed oceanographic station observations were made. If the data were collected by an institution of another country, the contributing country is listed after the one where the observations were taken.

Catalogue Number — The country and institution numbers and ship letter assigned to each ship are given in this column to facilitate locating data information in the catalogue.

## EXPLANATION OF THE GEOGRAPHICAL INDEX

The Geographical Index is based on the divisions of areas shown on the three charts immediately preceding the Index. These divisions are defined in "Limits of Oceans and Seas," Special Publication No. 23 of the International Hydrographic Bureau, third edition, Monaco, 1953. To define the extensive areas of the Atlantic, Indian, and Pacific Oceans more specifically, the following subdivisions have been added:

23 - North Atlantic Ocean

23a - Northeast Atlantic

23b - Northwest Atlantic

45 - Indian Ocean

45a - Northwest Indian

45b - Northeast Indian

45c - Southwest Indian

45d - Southeast Indian

SO - Southern Oceans

South of latitude 50° South

32 - South Atlantic Ocean

32a - Southeast Atlantic

32b - Southwest Atlantic

57 - North Pacific Ocean

57a - Northwest Pacific

57b - Northeast Pacific

61 - South Pacific Ocean

61a - Southwest Pacific

61b - Southeast Pacific

The catalogue numbers of ship cruises extending into any of the areas, or shore or fixed stations located in the areas, are listed under the area's number and name.

## ALPHABETICAL INDEX

Ship or Fixed Station	Country	Catalogue Number
- A -		
ALBATROSS IV	U.S.A.	139.23 D
Autonomous Benthic Rig	UNITED KINGDOM	238.05
- B -		
BUSAN 851	KOREA	143.02 Z 143.02 GG 243.01 C
BUSAN 881	KOREA	243.01 C
- C -		
CHOFU MARU	JAPAN	124.10 D
CHONNAM 881	KOREA	143.02 GG
	KOREA	243.01 C
- D -		
DAIOU	JAPAN	124.13 B
DAVID STARR JORDAN	U.S.A.	139.23 Y
- E -		
ENDEAVOR	U.S.A.	139.05 C
- F -		
FUJI	JAPAN	124.13 KKK
- G -		
GANGWON 867	KOREA	143.02 X
GYUNGBUG 885	KOREA	143.02 DD 243.01 F
- H -		
HAKUHO MARU	JAPAN	124.24 B
HATERUMA	JAPAN	124.13 B

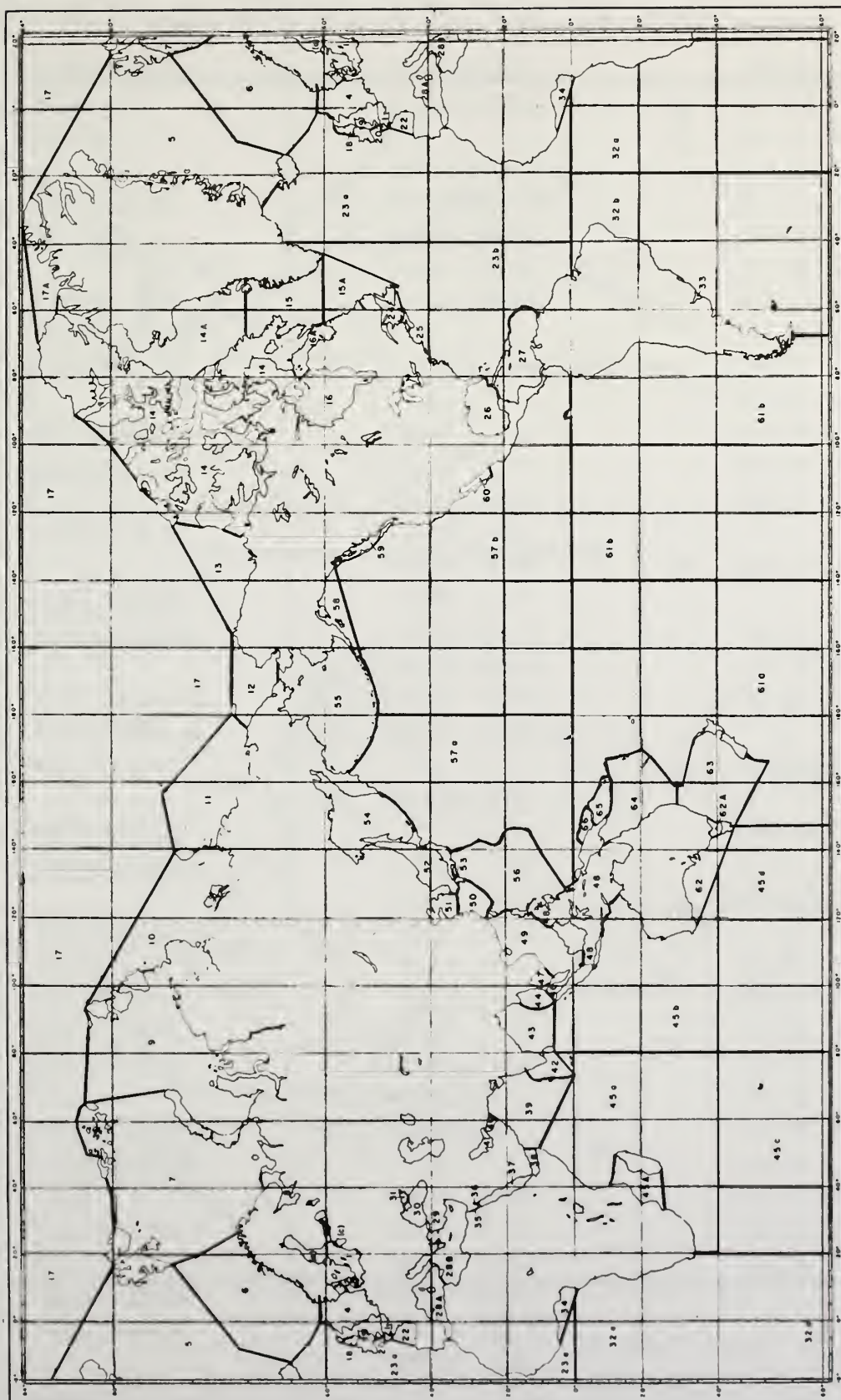
# ALPHABETICAL INDEX

Ship or Fixed Station	Country	Catalogue Number
HOKUSEI MARU	JAPAN	124.02 C
HOKUSHIN MARU	JAPAN	124.20 E
HOKUYO MARU	JAPAN	124.20 G
- I -		
INCHEON 866	KOREA	143.02 Y
INCHEON 888	KOREA	143.02 FF
IWAKI	JAPAN	124.13 B
- J -		
JEONBUK 868	KOREA	143.02 AA
JEONNAM 881	KOREA	143.02 EE
- K -		
KAIYO	JAPAN	124.13 B
KEIFU MARU	JAPAN	124.01 F
KINSEI MARU	JAPAN	124.20 C
KOFU MARU	JAPAN	124.08 D
KOSIKI	JAPAN	124.13 B
KOYO MARU	JAPAN	124.16 A
KUNIGAMI	JAPAN	124.13 B
KURIKOMA	JAPAN	124.13 B
- M -		
MATUSIMA	JAPAN	124.13 B
MEIYO	JAPAN	124.13 B
MILLER FREEMAN	U.S.A.	139.23 X
- N -		
NEW HORIZON	U.S.A.	139.08 V
NOTO	JAPAN	124.13 B
- O -		
OKI	JAPAN	124.13 B

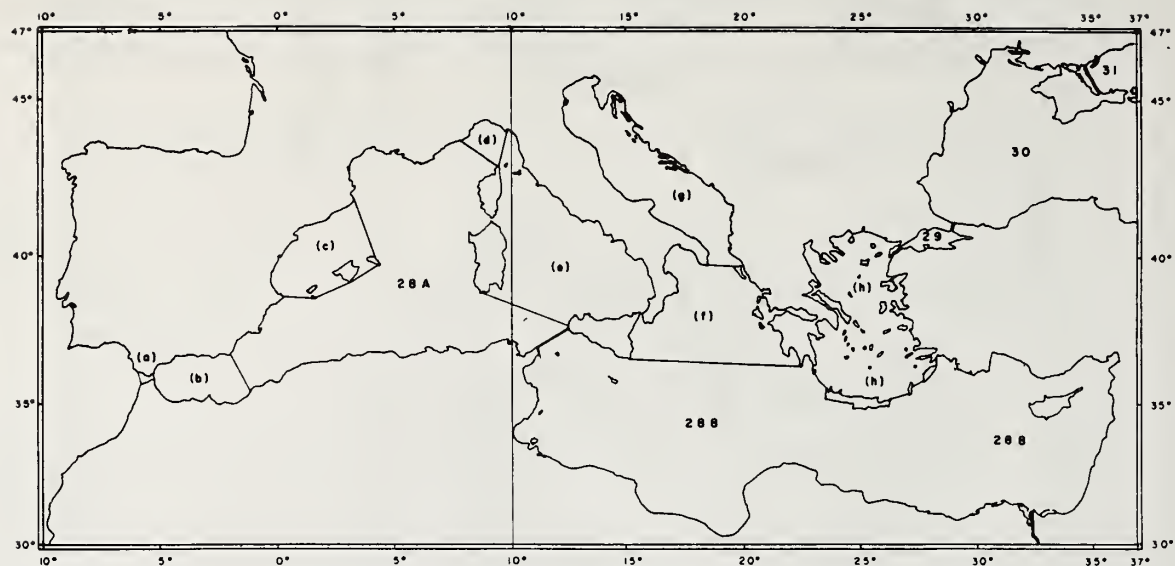


# ALPHABETICAL INDEX

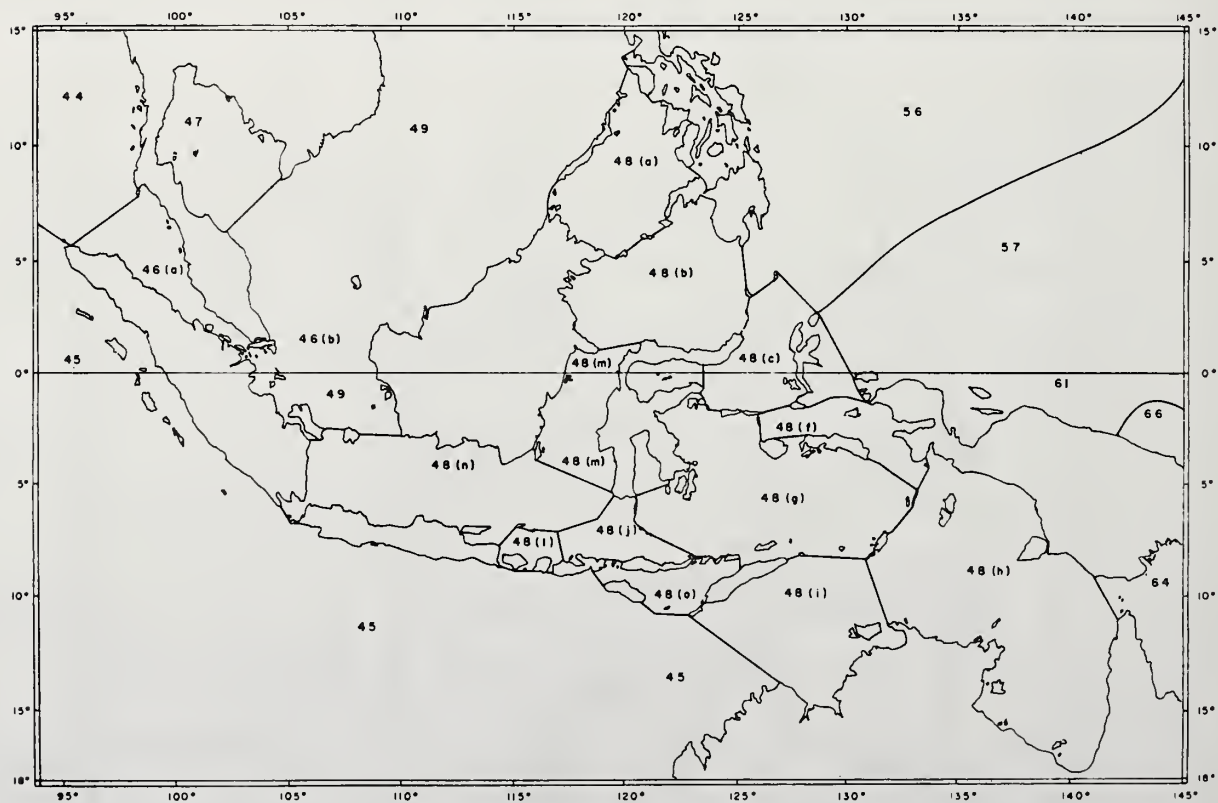
Ship or Fixed Station	Country	Catalogue Number
OSHORU MARU	JAPAN	124.02 B
OYASHIO MARU	JAPAN	124.20 B
- R -		
R. B. YOUNG	CANADA	106.19 A
REBUN	JAPAN	124.13 B
RYOFU MARU	JAPAN	124.01 B
- S -		
SATUMA	JAPAN	124.13 B
SEIFU MARU	JAPAN	124.11 D
SHIRASE	JAPAN	124.31 B
SHOYO	JAPAN	124.13 GGG
SHUMPU MARU	JAPAN	124.09 A
SIRETOKO	JAPAN	124.13 B
STRICKLAND	CANADA	106.19 J
- T -		
TAKUYO	JAPAN	124.13 E
TENYO MARU	JAPAN	124.13 J
TENYO MARU	JAPAN	124.16 B
TESIO	JAPAN	124.13 B
TYOKAI	JAPAN	124.13 B
- V -		
VECTOR	CANADA	106.19 A
- W -		
WAKASA	JAPAN	124.13 B
- Y -		
YAHIKO	JAPAN	124.13 B
YUBARI	JAPAN	124.13 B



WORLD GEOGRAPHICAL INDEX



GEOGRAPHICAL INDEX - DETAILS OF MEDITERRANEAN AREA



GEOGRAPHICAL INDEX - DETAILS OF INDONESIA AREA



# GEOGRAPHICAL INDEX

4. <u>NORTH SEA</u>  238.05	45d. <u>SOUTH EAST INDIAN OCEAN</u>  124.13 KKK-15 124.13 KKK-16 124.24 B-63 124.31 B-10 124.31 B-12	124.16 B-18 124.20 B-06 124.20 C-06 124.20 G-06 143.02 X-10 143.02 Z-07 143.02 DD-02 143.02 DD-03 143.02 EE-01 143.02 GG-01 243.01 C-25 243.01 C-26 243.01 F-03 243.01 F-04
23a. <u>NORTH EAST ATLANTIC</u>  139.05 C-12 139.05 C-13 139.23 D-36	50. <u>EASTERN CHINA SEA</u>  124.01 F-34 124.10 D-87 124.13 B-30 124.16 A-37 124.16 B-18 143.02 Z-07 143.02 EE-01 143.02 GG-01 243.01 C-25 243.01 C-26	54. <u>SEA OF OKHOTSK</u>  124.08 D-83 124.13 B-30 124.20 G-06
32a. <u>SOUTH EAST ATLANTIC</u>  124.31 B-12	51. <u>YELLOW SEA</u>  143.02 Y-10 143.02 Z-07 143.02 AA-07 143.02 EE-01 143.02 FF-01 243.01 C-25 243.01 C-26	55. <u>BERING SEA</u>  124.02 B-67
45a. <u>NORTH WEST INDIAN OCEAN</u>  124.13 KKK-15 124.13 KKK-16 124.31 B-12	52. <u>JAPAN SEA</u>  124.01 B-92 124.01 F-34 124.02 B-67 124.08 D-83 124.11 D-75 124.13 B-30	56. <u>PHILIPPINE SEA</u>  124.01 B-92 124.01 F-34 124.09 A-99 124.10 D-87 124.13 B-30 124.13 E-75 124.13 J-06 124.13 GGG-25 124.24 B-62 124.24 B-64
45b. <u>NORTH EAST INDIAN OCEAN</u>  124.13 KKK-15 124.13 KKK-16 124.16 B-18 124.31 B-10 124.31 B-12		
45c. <u>SOUTH WEST INDIAN OCEAN</u>  124.13 KKK-15 124.13 KKK-16 124.31 B-10 124.31 B-12		

## GEOGRAPHICAL INDEX

57a. NORTH WEST  
PACIFIC

124.01 B-92  
124.01 F-34  
124.02 B-67  
124.02 C-20  
124.08 D-83  
124.13 B-30  
124.13 E-75  
124.13 J-06  
124.13 GGG-25  
124.20 B-06  
124.20 C-06  
124.20 E-06  
124.24 B-63  
124.24 B-64

57b. NORTH EAST  
PACIFIC

124.02 B-67  
124.02 C-20  
124.16 A-37  
139.08 V-23  
139.23 Y-36  
139.23 Y-37

58. GULF OF ALASKA

124.02 B-67  
139.23 X-22  
139.23 X-23

59. THE COASTAL  
WATERS OF  
SOUTH EAST  
ALASKA AND  
BRITISH COLUMBIA

106.19 A-13  
106.19 A-14  
106.19 J-02

61a. SOUTH WEST  
PACIFIC

124.13 E-75  
124.16 A-37  
124.24 B-63  
124.31 B-10

63. TASMAN SEA

124.24 B-63  
124.31 B-10

64. CORAL SEA

124.24 B-63

SO. SOUTHERN  
OCEANS  
(South of latitude  
50 S)

124.13 KKK-15  
124.13 KKK-16  
124.24 B-63  
124.31 B-10  
124.31 B-12

## ***NUMERICAL LIST OF COUNTRIES***

- |                              |  |
|------------------------------|--|
| 1. ARGENTINA                 | 44. IVORY COAST                              |
| 2. AUSTRALIA                 | 45. NIGERIA                                  |
| 3. BELGIUM                   | 46. CONGO (People's Republic)                |
| 4. BRAZIL                    | 47. MALAYSIA                                 |
| 5. BURMA                     | 48. MALAGASY REPUBLIC                        |
| 6. CANADA                    | 49. MOROCCO                                  |
| 7. CHILE                     | 50. SENEGAL                                  |
| 8. COLOMBIA                  | 51. THAILAND                                 |
| 9. DENMARK                   | 52. TURKEY                                   |
| 10. ECUADOR                  | 53. VENEZUELA                                |
| 11. FINLAND                  | 54. EL SALVADOR                              |
| 12. TAIWAN                   | 55. COSTA RICA                               |
| 13. FRANCE                   | 56. PANAMA                                   |
| 14. GERMANY                  | 57. HONDURAS                                 |
| 15. GERMANY                  | 58. DOMINICAN REPUBLIC                       |
| 16. GHANA                    | 59. HAITI                                    |
| 17. GUATEMALA                | 60. CUBA                                     |
| 18. ICELAND                  | 61. JAMAICA                                  |
| 19. INDIA                    | 62. AUSTRIA                                  |
| 20. INDONESIA                | 63. ROMANIA                                  |
| 21. IRELAND                  | 64. EGYPT                                    |
| 22. ISRAEL                   | 65. LEBANON                                  |
| 23. ITALY                    | 66. ALGERIA                                  |
| 24. JAPAN                    | 67. MONACO                                   |
| 25. MEXICO                   | 68. GREECE                                   |
| 26. NETHERLANDS              | 69. TANZANIA                                 |
| 27. NEW ZEALAND              | 70. SIERRA LEONE                             |
| 28. NORWAY                   | 71. TUNISIA                                  |
| 29. PAKISTAN                 | 72. TRINIDAD AND TOBAGO                      |
| 30. PERU                     | 73. PEOPLE'S REPUBLIC OF<br>CHINA            |
| 31. PHILIPPINES              | 74. CZECHOSLOVAKIA                           |
| 32. POLAND                   | 75. MAURITANIA                               |
| 33. PORTUGAL                 | 76. BULGARIA                                 |
| 34. SPAIN                    | 77. BENIN                                    |
| 35. SWEDEN                   | 78. PEOPLE'S DEMOCRATIC<br>REPUBLIC OF YEMEN |
| 36. SOUTH AFRICA             | 79. IRAQ                                     |
| 37. RUSSIA                   | 80. LIBERIA                                  |
| 38. UNITED KINGDOM           | 81. SINGAPORE                                |
| 39. UNITED STATES OF AMERICA | 82. UKRAINE                                  |
| 40. URUGUAY                  | 83. REPUBLIC OF YEMEN                        |
| 42. YUGOSLAVIA               |  |
| 43. KOREA (Republic of)      |  |



## ***LIST OF DATA CENTER ACRONYMS***

AODC	Australian Oceanographic Data Centre
BODC	British Oceanographic Data Centre, United Kingdom
CEADO	Centro Argentino de Datos Oceanograficos
CECOLDO	Centro Colombiano de Datos Oceanograficos
CEDO	Centro Espanol de Datos Oceanograficos
CENADO	Centro Nacional de Datos Oceanograficos, Mexico
CENDOC	Centro Nacional de Datos Oceanograficos de Chile
CNODC	China National Oceanographic Data Center
CNRDO	Centro Nazionale Raccolta Dati Oceanografici, Italy
DOD	Deutsches Ozeanographisches Datenzentrum
ENODC	Egyptian National Oceanographic Data Center
ICES	International Council for the Exploration of the Sea
IHO	International Hydrographic Organization
INODC	Indian National Oceanographic Data Center
ISMARE	Irish Marine Data Centre
JODC	Japan Oceanographic Data Center
KODC	Korean Oceanographic Data Center
MARIS	Marine Informatie Service Stichting, Netherlands
MEDS	Marine Environmental Data Service, Canada
NOD	Norsk Oseanografisk Datasenter
NODC	National Oceanographic Data Center, U.S.A.
PSMSL	Permanent Service for Mean Sea Level
SADCO	South African Data Centre for Oceanography
SISMER	Systeme d'Informations Scientifiques pour la Mer

# INSTITUTION INDEX

Country		Institution	Catalogue Number	
06	CANADA	University of British Columbia, Institute of Oceanography. . . . .	106.19	
24	JAPAN	Japan Meteorological Agency . . . . .	124.01	
		Hokkaido University . . . . .	124.02	
		Hakodate Marine Observatory . . . . .	124.08	
		Kobe Marine Observatory . . . . .	124.09	
		Nagasaki Marine Observatory . . . . .	124.10	
		Maizuru Marine Observatory . . . . .	124.11	
		Maritime Safety Agency . . . . .	124.13	
		National Fisheries University, Shimonoseki .	124.16	
		Hokkaido Regional Fisheries Research Station . . . . .	124.20	
		Ocean Research Institute, University of Tokyo . . . . .	124.24	
		National Institute of Polar Research . . . . .	124.31	
38	UNITED KINGDOM	Proudman Oceanographic Laboratory . . . . .		238.05
39	UNITED STATES	University of Rhode Island . . . . .	139.05	
		Scripps Institution of Oceanography . . . . .	139.08	
		National Oceanic & Atmospheric Administration . . . . .	139.23	
43	KOREA	National Fisheries Research & Development Agency . . . . .	143.02	243.01





PART II

WDC-A, OCEANOGRAPHY  
DATA INFORMATION



## ***EXPLANATION OF THE WDC-A, OCEANOGRAPHY DATA INFORMATION SHEET***

The Change Notice lists on Data Information sheets the data which have been received by this Center. The entries are described below. Countries are arranged in the sequence shown in the numerical list of countries. Data from each country are arranged in the sequence of catalogue numbers. The 200-series data sheets follow the last 100-series data sheet in the catalogue.

Country/Catalogue Number — The series number and two digit number of the contributing country, as well as the identifying number for the data information, are given in this column. Details of the catalogue numbering system are given in the section "How to Use the Change Notice to the Catalogue of Data". The numbers corresponding to the country and institution portions of the Catalogue Number are found in the index section that lists countries and contributing institutions.

Country/Ship or Fixed Station — The country name, as well as the names of ships are printed in capital letters; lightvessels are identified by (LV) following the name. All other names not so designated are those of shore stations and other types of fixed platforms, such as lighthouses (LH) or offshore towers; names are reported as they appear with the data.

Start Date/End Date — The dates during which the data were gathered are given in the order of day/month/year. In some instances, depending on the nature of the project, the dates indicate the beginning and ending of a cruise or expedition, while in others the dates indicate the first and last observations. For shore and fixed stations months and years only are usually given.

Region — The region(s) of the World Ocean where observations were gathered. The areas listed are defined in "Limits of Oceans and Seas," International Hydrographic Bureau, Special Publication No. 23, third edition, Monaco, 1953, with certain modifications as indicated in the Catalogue Indexes section.

### *Oceanographic Serial Stations:*

Number of Stations — The number of oceanographic serial stations (also referred to as hydrographic, hydrographical, hydrological and hydrochemical stations by various authorities) at which serial measurements of temperature, salinity, and other chemical values are made, normally to depths of five meters or greater. Data to depths less than five meters are usually catalogued as Surface Observations. The single dagger symbol (†) is used to denote data obtained by electronic, in-situ, Salinity/Temperature/Depth (STD) or Conductivity/Temperature/ Depth (CTD) sensors.



Physical and Chemical Data — All stations as a minimum have readings of both temperature and salinity, unless otherwise noted. The types of physical and chemical data, available at serial depths as observed values, are listed using the following symbols and abbreviations:

- Oxy - Dissolved oxygen content
- Nutr - Nitrogen, Phosphorous, or Silicon compounds
- Pol - Heavy Metals, Hydrocarbons or other pollutants

BT's — The type and number of mechanical bathythermograph (MBT) or expendable bathythermograph (XBT) observations are indicated by:

- MB - Analog prints of bathythermographs taken by a mechanical BT
- MTb - Tables or listings of mechanical BT temperature readings at selected depths
- XB - Analog prints of bathythermographs taken by an expendable BT
- XTb - Tables or listings of expendable BT temperature readings at selected depths
- DTb - Table or listings of digital BT temperature readings at selected depths
- STb - Tables or listings of bathythermographs reported at selected levels only, eg. 5m. intervals

Currents — The types and quantity of observations of surface and subsurface currents are indicated by:

- Surf - Surface
- Subs - Subsurface

Biological — The types of marine biological observations made and the number of stations and/or abundance of data are indicated by any of the following categories:

- |                                |                             |
|--------------------------------|-----------------------------|
| Phyt - Phytoplankton           | Pleu - Pleuston             |
| Pigm - Pigments                | Sest - Seston               |
| PrPr - Primary productivity    | Neus - Neuston              |
| Zoo - Zooplankton              | Bent - Benthos              |
| Nek - Nekton                   | PeF - Pelagic fishes        |
| Eggs - Fish eggs and/or larvae | DeF - Demersal fishes       |
| Micr - Microbiological data    | FObs - Fishery observations |
| Biol - Bioluminescence         | Bore - Borers and foulers   |
| Poll - Pollution studies       | Cet - Cetacea               |
| C14 - Carbon                   |                             |

Surf - Surface visual observations of birds, fishes  
mammals, reptiles or discolored water

Meteorological — The presence of meteorological observations taken in conjunction with oceanographic data is indicated. These observations may include wind direction and speed, weather, temperature of the air, dry bulb or wet bulb, atmospheric pressure, clouds, visibility, humidity, dew point, precipitation, solar radiation, or radiosonde observations.

Sea Surface — The types of sea surface observations and measurements taken are listed. In addition to the abbreviations and symbols listed for Physical and Chemical Data, the following are also used:

T - Temperature of the water sample  
S - Salinity  
Col - Color of the water  
Tra - Transparency of the water  
Wa - Visual data on waves, including sea state  
IWa - Instrumented wave data  
Ice - Data on ice in the sea  
LP - Light penetration  
LPW - Long period wave records

Data Center Reference Number — Data which have been processed at a national, regional, or responsible oceanographic data center, usually have been assigned some type of identifying reference number by that center. The availability of data in automated form is indicated by the initials of the data center followed by that center's reference number. For example, machine-processed oceanographic station data for Reference Number 310863 of the National Oceanographic Data Center would appear as NODC 310863.

Publication number refers to the number from the WDC-A, Oceanography "Listing of Accessioned Data Publications" identifying the published report in which the referenced data appear. The absence of a number in this column indicates that the data were not received in published or processed form.

Remarks — Any additional information included to further describe the data. The term "(CAT. OF DATA)" or "(Change)", indicates that data for this listed cruise represent an addition to data previously received by WDC-A, Oceanography, and already described under this Catalogue Number in the Catalogue of Data (including Change Notice Nos. 1-16) or the referenced Change Notice. An asterisk (\*) is placed beside each data entry which represents an addition to data catalogued previously; the total number of observations held for this cruise is shown in parentheses ( ) beneath the data entry. Data entries preceded by a minus sign (-) and enclosed in parentheses, e.g. (-9), indicate a deletion of observations.

WDC-A, OCEANOGRAPHY DATA INFORMATION

CATALOGUE NO.	SHIP/FIXED STATION	DATE		IHB REGION	NO. OF STAS.	PARA- METERS	BTs	TYPES OF OBSERVATIONS				PUBLICATION NUMBER / DATA CENTER NUMBER	REMARKS
		START	END					CURRENTS	BIOLOGY	MET.	SEA SURFACE		
106.....	CANADA.....												
106.19 A-13	VECTOR, R. B. YOUNG	07/03/95	09/03/95	59	15 † Oxy					X		06.08-018	Cruise 95/01
106.19 A-14	VECTOR, R. B. YOUNG	13/03/96	02/08/96	59	32 † Oxy					X		06.08-018	Cruises 96/01, 96/04
106.19 J-02	STRICKLAND	01/03/94	03/03/94	59	11 † Oxy					X		06.08-018	Cruise 94/02
124.....	JAPAN.....												
124.01 B-92	RYOFU MARU	18/01/95	12/12/95	52, 56, 57a	155 † Oxy, Nutr		XTb-95	Subs-262	Phyt-58 Zoo-58 Pigm-76		T, S	24.07-093	Cruises 9501, 9507, 9508, 9510, 9511
124.01 F-34	KEIFU MARU	18/01/95	24/11/95	50, 52, 56, 57a	157 † Oxy, Nutr		XTb-180	Subs-578			T, S	24.07-093	Cruises 9501, 9504, 9506, 9508, 9510
124.02 B-67	OSHO MARU	05/11/95	04/09/96	52, 55, 57a, 57b, 58	204 † Nutr				Phyt-347 FObs-48	X	Wa, Col, Tra	24.04-053	Cruises 64, 66, 67, 69, 70
124.02 C-20	HOKUSEI MARU	22/01/96	04/10/96	57a, 57b	105 †		XTb-6		Phyt-56 FObs-59	X	T, Wa, Col, Tra	24.04-053	Cruises 69 thru 72
124.08 D-83	KOFU MARU	18/01/95	20/12/95	52, 54, 57a	436 † Oxy, Nutr		XTb-48	Subs-541	Phyt-31 Zoo-31 Pigm-156		T, S	24.07-093	Cruises 9501, 9502, 9504, 9506, 9507, 9510, 9511
124.09 A-99	SHUMPU MARU	24/04/95	30/10/95	56	104 † Oxy, Nutr		XTb-157	Subs-324	Phyt-36 Zoo-31 Pigm-54		T, S	24.07-093	Cruises 9504, 9506, 9508, 9510
124.10 D-87	CHOFU MARU	17/01/95	20/12/95	50, 56	387 † Oxy, Nutr		XTb-92	Subs-663	Phyt-44 Zoo-44 Pigm-44			24.07-093	Cruises 9501, 9504, 9506, 9510, 9511
124.11 D-75	SEIFU MARU	18/01/95	21/12/95	52	444 † Oxy, Nutr		XTb-35	Subs-501	Phyt-43 Zoo-44 Pigm-116			24.07-093	Cruises 9501, 9502, 9504, 9506, 9510, 9511
124.13 B-30	KAIYO, DAIOU, HATERUMA, IWAKI, KOSIKI, KUNIGAMI, KURIKOMA, MATSUSIMA, MEIYO, NOTO, OKI, REBUN, SATUMA, SIRETOKO, TESIO, TYOKAI, WAKASA, YAHIKO, YUBARI	12/01/94	19/12/94	50, 52, 54, 56, 57a			XTb-998	Surf-1,478		X	Wa	24.10-065	

\* DATA FOR THIS CRUISE REPRESENT AN ADDITION TO DATA PREVIOUSLY RECEIVED BY WDC, OCEANOGRAPHY.

† DENOTES DATA OBTAINED BY ELECTRONIC, IN-SITU, CONDUCTIVITY/SALINITY/TEMPERATURE/DEPTH (CTD/STD) SENSORS.

†† ALL STATIONS AS A MINIMUM HAVE READINGS OF BOTH TEMPERATURE AND SALINITY, UNLESS OTHERWISE NOTED.



## WDC-A, OCEANOGRAPHY DATA INFORMATION

CATALOGUE NO.	SHIP/FIXED STATION	DATE		IHB REGION	NO. OF STAS.	PARA-METERS	BTs	CURRENTS	BIOLOGY	MET.	SEA SURFACE	PUBLICATION NUMBER / DATA CENTER NUMBER	REMARKS
		START	END										
124.13 E-75	TAKUYO	15/02/95	12/03/95	56, 57a 61a	36 †	Oxy, Nutr Pol	XTb-79	Surf-470		X	Wa	24.10-064	WESTPAC 12th Cruise
124.13 J-06	TENYO MARU	18/04/94	23/04/94	56, 57a			XTb-49			X		24.10-065	
124.13 GGG-25	SHOYO	14/01/94	05/08/94	56, 57a	109 †	Oxy, Nutr	XTb-361		Phyt-7	X	Wa	24.10-065	Cruise JARE-23
124.13 KKK-15	FUJI	26/11/81	17/04/82	45a, 45b, 45c, 45d, SO								24.22-049	
124.13 KKK-16	FUJI	26/11/82	20/04/83	45a, 45b, 45c, 45d, SO					Phyt-10			24.22-049	Cruise JARE-24
124.16 A-37	KOYO MARU	11/04/95	24/12/95	50, 57b, 61a	51 †		XTb-10		FObs-6	X	T, S; Wa, Col, Tra	24.11-059	TOGA (Dec. Cruise only)
124.16 B-18	TENYO MARU	14/05/95	12/10/95	45b, 50, 52	30 †		XTb-10		FObs-10	X	T, S; Wa, Tra	24.11-059	
124.20 B-06	OYASHIO MARU	07/04/89	14/03/90	52, 57a	305 †	Oxy, Nutr			Phyt-112 Pigm-10	X	Tra	24.06-069	263 CTD stations
124.20 C-06	KINSEI MARU	06/04/89	15/03/90	52, 57a	500				Phyt-12	X	Tra	24.06-069	
124.20 E-06	HOKUSHIN MARU	17/04/89	23/02/90	57a	310 †				Phyt-29	X	Tra	24.06-069	
124.20 G-06	HOKUYO MARU	10/04/89	10/03/90	52, 54	489 †				Phyt-43	X	Tra	24.06-069	
124.24 B-62	HAKUHO MARU	19/06/94	03/07/94	56	28 †				Pigm-18 FObs-257			24.13-084	Cruise KH94-2, Eel Cruise VI, Leg 3
124.24 B-63	HAKUHO MARU	26/11/94	13/02/95	45d, 57a, 61a, 63, 64, SO	59 †	Oxy, Nutr		Subs-3	Phyt-2 Zoo-2 Micr-73			24.13-085	Cruise KH94-4, Legs 1-4
124.24 B-64	HAKUHO MARU	13/05/95	11/06/95	56, 57a	87 †	Oxy, Nutr						24.13-086	Cruise KH95-1, Legs 1&2
124.31 B-10	SHIRASE	15/11/92	20/03/93	45b, 45c, 45d, 61a, 63, SO	32 †	Oxy, Nutr	XTb-128			X	T, S, Oxy, Nutr.	24.22-050	Cruise JARE-34
124.31 B-12	SHIRASE	14/12/83	15/03/96	32a, 45a, 45b, 45c, 45d, SO					Phyt-203		Wa *	24.22-049	Cruises JARE-25, 26, 28 through 37
139	UNITED STATES												
139.05 C-12	ENDEAVOR	11/01/95	18/06/95	23b	319 †							NODC 9700018	Cruises 259, 260, 262, 264, 266, 267, GLOBEC

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†† ALL STATIONS AS A MINIMUM HAVE READINGS OF BOTH TEMPERATURE AND SALINITY, UNLESS OTHERWISE NOTED.

## WDC-A, OCEANOGRAPHY DATA INFORMATION

CATALOGUE NO.	SHIP/FIXED STATION	DATE		IHB REGION	NO. OF STAS.	PARA- METERS ††	TYPES OF OBSERVATIONS				SEA SURFACE	PUBLICATION NUMBER / DATA CENTER NUMBER	REMARKS
		START	END				BTs	CURRENTS	BIOLOGY	MET.			
139.05 C-13	ENDEAVOR	12/01/96	18/04/96	23b	94 †							NODC 9700033	Cruises 276, 278, 282, GLOBEC
139.08 V-23	NEW HORIZON	6/10/95	28/10/95	57b	20 †	Oxy, Nutr			Zoo-66 Pigm-20 PrPr-15	X	Wa, Col, Tra	39.01-342	Cruise 9510, CalCOFI
139.23 D-36	ALBATROSS IV	06/05/96	11/06/96	23b	111 †							NODC 9700033, 9700037	Cruises 276, 9605, 9607, GLOBEC
139.23 X-22	MILLER FREEMAN	13/02/96	28/04/96	58	66 †							NODC 9700082	Cruises 9601, 9604, 9607 FOCI
139.23 X-23	MILLER FREEMAN	20/02/97	26/02/97	58	34 †							NODC 9700082	Cruise 9701, FOCI
139.23 Y-36	DAVID STARR JORDAN	06/07/95	23/07/95	57b	66 †	Oxy, Nutr			Zoo-66 Pigm-66 PrPr-15	X	Wa, Col, Tra	39.01-342	Cruise 9507, CalCOFI
139.23 Y-37	DAVID STARR JORDAN	29/01/96	03/05/96	57b	131 †	Oxy, Nutr			Zoo-125 Pigm-131 PrPr-30	X	Wa, Col, Tra	39.01-343	Cruises 9602, 9604, CalCOFI
143.....	KOREA.....												
143.02 X-10	GANGWON 867	22/02/95	09/06/95	52	60	Oxy, Nutr			Zoo-31	X	Wa, Col, Tra	43.02-089	Standard Section
143.02 Y-10	INCHEON 866	07/02/95	09/10/95	51	180	Oxy, Nutr			Zoo-88	X	Wa, Col, Tra	43.02-089	Standard Section
143.02 Z-07	BUSAN 851	07/02/95	13/11/95	50, 51, 52	131	Oxy, Nutr			Zoo-63	X	Wa, Col, Tra	43.02-089	Standard Section
143.02 AA-07	JEONBUK 868	01/06/95	20/12/95	51	131	Oxy, Nutr			Zoo-62	X	Wa, Col, Tra	43.02-089	Standard Section
143.02 DD-02	GYUNGBUG 885	07/04/95	15/12/95	52	301	Oxy, Nutr			Zoo-152	X	Wa, Col, Tra	43.02-089	Standard Section
143.02 DD-03	GYUNGBUG 885	08/02/96	16/12/96	52	395	Oxy, Nutr			Zoo-179	X	Wa, Col, Tra	43.02-090	Standard Section
143.02 EE-01	JEONNAM 881	07/04/95	15/12/95	50, 51, 52	240	Oxy, Nutr			Zoo-233	X	Wa, Col, Tra	43.02-089	Standard Section
143.02 FF-01	INCHEON 888	07/02/96	13/12/96	51	360	Oxy, Nutr			Zoo-150	X	Wa, Col, Tra	43.02-090	Standard Section

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## WDC-A, OCEANOGRAPHY DATA INFORMATION

CATALOGUE NO.	SHIP/FIXED STATION	DATE		IHB REGION	NO. OF STAS.	PARA- METERS	BTs	TYPES OF OBSERVATIONS				PUBLICATION NUMBER / DATA CENTER NUMBER	REMARKS
		START	END					CURRENTS	BIOLOGY	MET.	SEA SURFACE		
143.02 GG-01	CHONNAM 881, BUSAN 851	03/02/96	12/12/96	50, 52	376	Oxy, Nutr			Zoo-156	X	Wa, Col, Tra	43 02-090	Standard Section
238.....	UNITED KINGDOM.....												
238.05	Autonomous Benthic Rig	15/10/94	16/02/95	4				Subs-780			Wa	38 14-409 38 14-410	STABLE Deployments 1 and 2
243.....	KOREA.....												
243.01 C-25	BUSAN 851, BUSAN 881	08/02/95	14/12/95	50, 51, 52	72	Oxy			Zoo-29	X	Wa, Col, Tra	43 02-089	Korea-Japan Cooperative
243.01 C-26	CHONNAM 881	04/02/96	08/12/96	50, 51, 52	72	Oxy, Nutr			Zoo-29	X	Wa, Col, Tra	43 02-090	Korea-Japan Cooperative
243.01 F-03	GYUNGBUG 885	15/08/95	18/08/95	52	17	Oxy				X	Wa, Col, Tra	43 02-089	Standard Section, Line 500
243.01 F-04	GYUNGBUG 885	17/08/96	19/08/96	52	17							43 02-090	Standard Section, Line 500

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## ***WDC-A, OCEANOGRAPHY DATA INFORMATION***

The preceeding section now lists primarily those data actually received directly by WDC-A from its international contributors, usually in either publications or in manuscript form. Data received in automated form from Data Centers (including the U.S. NODC), oceanographic institutions, or special project data centers are now identified and described in later sections of this Catalogue.

### ***LISTING OF ACCESSIONED DATA PUBLICATIONS***

WDC-A, Oceanography no longer publishes the yearly Supplements to the Catalogue of Accessioned Publications; thus, the Center can no longer present a full correlation of the catalogued data with corresponding published references. The following Listing of Accessioned Data Publications now references by title and responsible institution all publications received during the period that contain cataloguable data; it cross-references data publication information with the pertinent WDC-A Data Information Number.



# LISTING OF ACCESSIONED DATA PUBLICATIONS

WDC-A Publication No.	Data Publication Title	WDC-A Data Information No.
06	CANADA	
06.08-018.1	Data Report 63, British Columbia Inlets Cruises 1994 (University of British Columbia, Department of Oceanography, January 1995)	106.19 J-02
06.08-018.2	Data Report 64, British Columbia Inlets Cruises 1995 (University of British Columbia, Department of Oceanography, February 1996)	106.19 A-13
06.08-018.3	Data Report 65, British Columbia Inlets Cruises 1996 (University of British Columbia, Department of Oceanography, January 1997)	106.19 A-14
24	JAPAN	
24.04-053	Data Record of Oceanographic Observations and Exploratory Fishing, No. 40 (Hokkaido University, March 1997)	124.02 B-67, 124.02 C-20
24.06-069	Data Record of Oceanographic Observations, No. 5, April 1989 - March 1990 (Hokkaido Fisheries Experimental Station, March 1997)	124.20 B-06, 124.20 C-06, 124.20 E-06, 124.20 G-06
24.07-093	Data Report of Oceanographic Observations, No. 86, January-December, 1995 (Japan Meteorological Agency, December 1997)	124.01 B-92, 124.01 F-34, 124.08 D-83, 124.09 A-99, 124.10 D-87, 124.11 D-75
24.10-064	Data Report of Hydrographic Observations, Series of WESTPAC, Results of Oceanographic Observations for 1995 (Maritime Safety Agency, No. 11, March 1996)	124.13 E-75
24.10-065	Data Report of Hydrographic Observations, Series of Oceanography, Results of Oceanographic Observations for 1994 (Maritime Safety Agency, No. 32, March 1996)	124.13 B-30, 124.13 J-06, 124.13 GGG-25

## LISTING OF ACCESSIONED DATA PUBLICATIONS

WDC-A Publication No.	Data Publication Title	WDC-A Data Information No.
24.11-059	Data of Oceanographic Observations and Exploratory Fishings, No. 22. Oceanographic Observations and Exploratory Fishings in the East China Sea, Eastern Indian Ocean, Japan Sea, and Central Pacific Ocean (National Fisheries University, Shimonoseki, December 1996)	124.16 A-37, 124.16 B-18
24.13-084	Preliminary Report of the HAKUHO MARU Cruise KH94-2 (Leg 3), June 16 - July 7, 1994, (Eel Cruise VI) (Ocean Research Institute, University of Tokyo, 1995)	124.24 B-62
24.13-085	Preliminary Report of the R/V HAKUHO MARU Cruise KH94-4, Southern Ocean Expedition (November 22, 1994 - February 14, 1995) (Ocean Research Institute, University of Tokyo, 1999)	124.24 B-63
24.13-086	Preliminary Report of the HAKUHO MARU Cruise KH95-1, 12 May - 12 June 1995, Studies on the Kuroshio and Deep Currents in the Western North Pacific (Ocean Research Institute, University of Tokyo, 1996)	124.24 B-64
24.22-049	Plankton Sampling on Board SHIRASE in 1983 - 1996, NORPAC Standard Net Samples, JARE Data Reports, No. 224 (Marine Biology 28) (National Institute of Polar Research, March 1997)	124.13 KKK-15, 124.13 KKK-16, 124.31 B-12
24.22-050	Oceanographic Data of the 34th Japanese Antarctic Research Expedition from November 1992 to March 1993, JARE Data Reports, No. 228 (Oceanography 17) (National Institute of Polar Research, September 1997)	124.31 B-10
38	UNITED KINGDOM	
38.14-409	Analysis of STABLE Data from Deployment 1, Holderness, UK, October 1994 (Proudman Oceanographic Laboratory, Report No. 42, 1996)	238.05
38.14-410	Analysis of STABLE Data from Deployment 2, Holderness, UK, January - February, 1995 (Proudman Oceanographic Laboratory, Report No. 43, 1996)	238.05

## LISTING OF ACCESSIONED DATA PUBLICATIONS

WDC-A Publication No.	Data Publication Title	WDC-A Data Information No.
39	UNITED STATES	
39.01-342	Data Report, Physical, Chemical, and Biological Data, CalCOFI Cruise 9507, 6 - 23 July 1995; CalCOFI Cruise 9510, 6-28 October 1995 (Scripps Institution of Oceanography, Reference 96-11, 1 August 1996)	139.08 V-23, 139.23 Y-36
39.01-343	Data Report, Physical, Chemical, and Biological Data, CalCOFI Cruise 9602, 29 January - 16 February 1996; CalCOFI Cruise 9604, 15 April - 3 May 1996 (Scripps Institution of Oceanography, Reference 96-19, 8 October 1996)	139.23 Y-37
43	KOREA	
43.02-089	Annual Report of Oceanographic Observations for 1995 (National Fisheries Research and Development Agency, Volume 44, December 1996)	143.02 X-10, 143.02 Y-10, 143.02 Z-07, 143.02 AA-06, 143.02 DD-02, 143.02 EE-01, 243.01 C-25, 243.01 F-03
43.02-090	Annual Report of Oceanographic Observations for 1996 (National Fisheries Research and Development Agency, Volume 45, December 1996)	143.02 DD-03, 143.02 FF-01, 143.02 GG-01, 243.01 C-26, 243.01 F-04





**PART III**

**INTERNATIONAL DATA ACQUISITION  
AND EXCHANGE**

**THE INTERNATIONAL MARINE  
DATA BASE**



## International Data Acquisition and Exchange

For the 40-year period since its inception during the International Geophysical Year (IGY), WDC-A, Oceanography has provided comprehensive tabulations of its yearly accessions and cumulative holdings as a reference standard by which the relative success of international oceanographic data exchange thru the WDC system (under both ICSU and IOC/IODE guidelines) can be measured. It has become increasingly apparent during recent years, however, that in order to maintain consistency and continuity in this process, WDC-A must significantly modify its traditional approach to take into account changing conditions. The advent of data acquisition programs, such as the Global Data Archaeology and Rescue (GODAR) Project, combined with enhanced capabilities to utilize CD-ROM technology and electronic data transmission for the rapid exchange of large data sets, have resulted in a major infusion of data into WDC-A's data bases.

A problem resulting from this obvious success story has been the difficulty that WDC-A has experienced in attempting to catalogue and tabulate these massive data sets, using standard (traditional) cataloguing procedures. Additionally, the sheer magnitude of many of these data sets (which may contain historical observations taken over many years) often tends to overshadow the all-important yearly data accessions from WDC-A's regular contributors. To address these problems, WDC-A has evaluated its most recent yearly data accessions with a view toward the need to give proper recognition to its regular contributors, while at the same time attempting to provide somewhat more detail with regard to data sets received through programs such as GODAR.

Through this process, the following general categories have been identified as representing major components of WDC-A's International Marine Data Base (**Figure 1**):

1. Regular accessions from WDC-A contributors representing observations that can be catalogued using standard (traditional) cataloguing procedures (**Tables 1-4**);
2. Historical data received under the aegis of the GODAR Program (**Tables 5-7**);
3. Data received in digital form through the co-located U.S. National Oceanographic Data Center (NODC) (**Tables 8-11**).

The International Marine Data Base of WDC-A, Oceanography, then, as depicted in **Figure 1**, now comprises the Center's total data holdings - that is, it summarizes data holdings from all three categories. Category 1 is defined as the material already identified and described in Part II of this Catalogue; explanations are further expanded upon on Page 34. Brief descriptions follow for Categories 2 and 3.

## **Global Data Archaeology and Rescue (GODAR) Project**

The goal of the GODAR program is to augment the historical digital oceanographic data archives by seeking out and recovering manuscript and digital ocean data not yet included in the digital ocean databases accessible to the world research community. The term Data Archaeology and Rescue describes the two-part process of first identifying and locating the data, and then performing the necessary steps to merge them into a digital database. The enhanced historical ocean data archives resulting from this Project have led to improved ocean climatologies and have also supported more complete studies of ocean variability. The following activities are undertaken as a part of the GODAR process:

- prepare inventories of data available only in manuscript or other analog form, as well as data not currently available in digital form at a national or World Data Center;
- digitize data that now exist only in manuscript or other analog form;
- ensure that all oceanographic data available for international exchange are archived in digital form;
- perform Quality Control on all data;
- make all data readily accessible to the international community.

WDC-A has very substantially augmented its data bases through numerous GODAR contributions during recent years. Such contributions do not reflect, however, the total benefit derived from GODAR; many digitally-received GODAR contributions, that did not represent data "new" to WDC-A, were of equal importance because they represented data sets previously received by the WDCs in manuscript form only, as well as "rescued" data that had been held by originators on magnetic media that were susceptible to loss by degradation.

The basic premise of GODAR seems to engender a spirit of cooperation; many countries have contributed data that had previously been unavailable for international exchange. GODAR has also presented an excellent opportunity for developing countries to become more intimately involved with the IODE data management process. GODAR has provided a mechanism with the implementation of Regional Workshops, through which developing countries can facilitate the processing, exchange, and preservation of oceanographic data.

### **Data Received in Digital Form through NODC**

WDC-A benefits significantly from its co-location with the U.S. National Oceanographic Data Center (NODC). In addition to providing automated data management services in support of WDC-A, the NODC is an excellent source of oceanographic data in digital form for national, as well as international, data-gathering programs. Over the years, NODC has been a Special Project Data Center for numerous international cooperative investigations; this has led to the ready availability to WDC-A of many important international data sets in digital form.



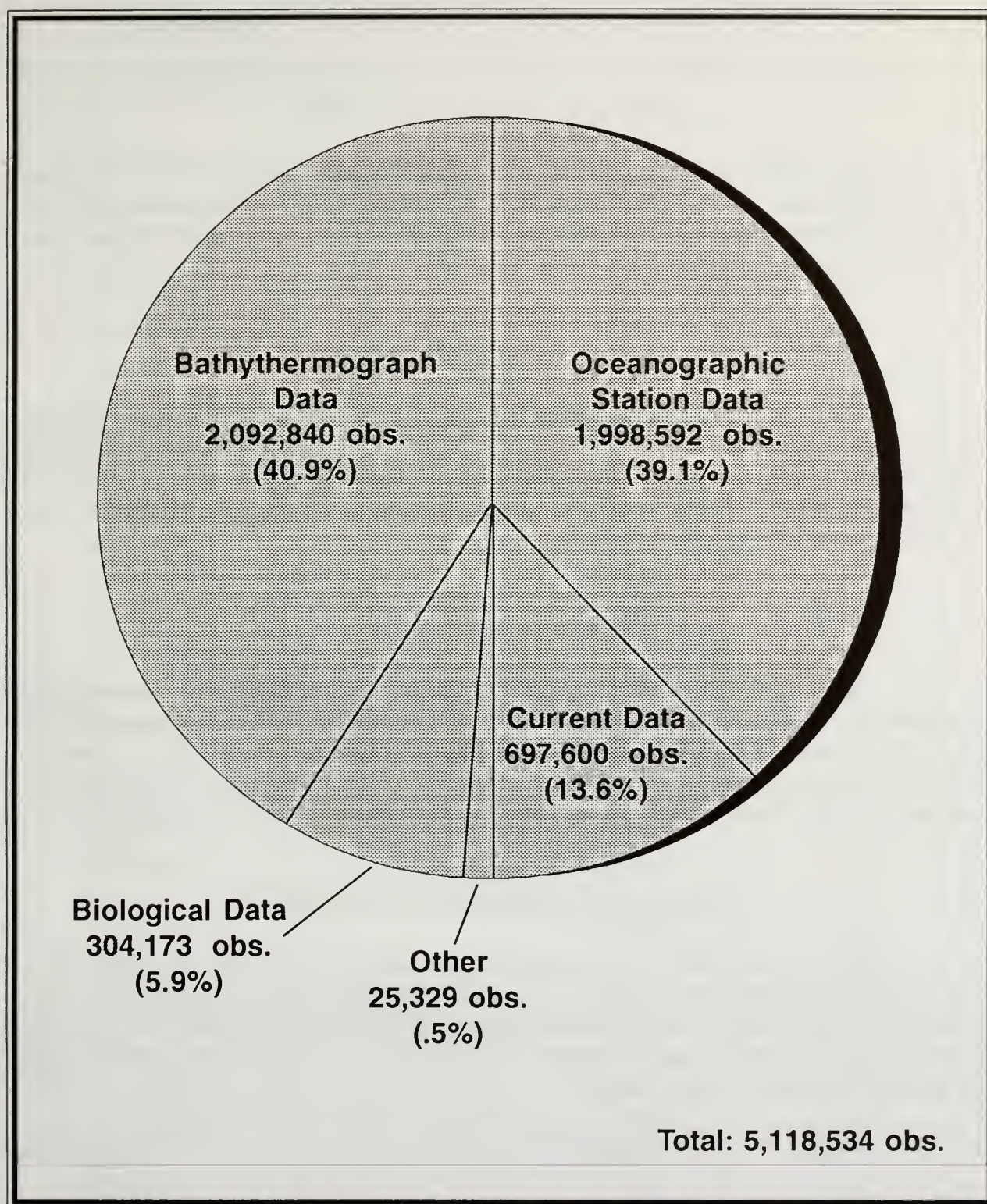


Figure 1. International Marine Data Base of WDC-A, Oceanography

# WDC-A, Oceanography Data Base\* Summaries

## *Oceanographic Station Data Base*

Table 1 (page 35) summarizes the 1,347,087 oceanographic serial stations received by nation under which these data are catalogued. Nations from which no station data have been received are not listed, although in some cases publications or other types of data may have been received.

## *Bathythermograph Data Base*

Table 2 (page 37) summarizes the number of bathythermograph observations received from the nation under which the data are catalogued. The number of cruises on which the data were observed is also listed. A total of 602,727 bathythermograph observations were taken during 9,268 cruises, which includes 2,248 observations received in 1997.

## *Biological Data Base*

Table 3 (page 38) shows, by nation, the number of biological observations received by this Center since its inception and includes 3,876 observations received in 1997. A total of 171,575 observations, including plankton observations, primary productivity measurements, pigment concentration measurements, carbon-14 measurements, and fishery observations, have been taken during 2,123 cruises.

## *Surface and Subsurface Current Data Base*

Table 4 (page 39) summarizes, by nation, the number of surface and subsurface current measurements received by this Center since its inception. The total of 697,600 current measurements includes 113,093 subsurface and 584,507 surface measurements taken during 4,243 cruises. A total of 5,600 new current measurements were added in 1997.

\* Tabulations for these Data Bases (Tables 1 - 4) include cumulative historical and contemporary accessions of data from regular exchanges with WDC-A contributors, and represent *only* observations that could be catalogued using standard cataloguing procedures. Recent data accessions from the GODAR Program and of digital data sets from NODC are *not* included in Tables 1-4.



## Oceanographic Station Data Base

Table 1. -- Number of oceanographic serial stations received by WDC-A, Oceanography,  
from various nations

Nation	Stations Received in 1997	Total Stations on Hand prior to 1997	Total Stations on Hand at end of 1997
1. Argentina	--	2,833	2,833
2. Australia	--	19,256	19,256
3. Belgium	--	4,941	4,941
4. Brazil	--	7,496	7,496
6. Canada	58	75,846	75,904
7. Chile	--	1,048	1,048
8. Colombia	--	1,267	1,267
9. Denmark	--	40,701	40,701
10. Ecuador	--	2,234	2,234
11. Finland	--	39,194	39,194
12. Taiwan	--	693	693
13. France	--	23,399	23,399
14. Germany	--	66,136	66,136
16. Ghana	--	2,772	2,772
18. Iceland	--	10,567	10,567
19. India	--	2,094	2,094
20. Indonesia	--	2,352	2,352
21. Ireland	--	2,553	2,553
22. Israel	--	2,410	2,410
23. Italy	--	4,160	4,160
24. Japan	4,029	413,969	417,998
25. Mexico	--	1,517	1,517
26. Netherlands	--	10,377	10,377
27. New Zealand	--	1,941	1,941
28. Norway	--	40,152	40,152
29. Pakistan	--	174	174
30. Peru	--	4,016	4,016
31. Philippines	--	199	199

(continued)

## Oceanographic Station Data Base

Table 1. -- Number of oceanographic serial stations received by WDC-A, Oceanography, from various nations (continued)

Nation	Stations Received in 1997	Total Stations on Hand prior to 1997	Total Stations on Hand at end of 1997
32. Poland	--	9,174	9,174
33. Portugal	--	3,959	3,959
34. Spain	--	1,931	1,931
35. Sweden	--	56,975	56,975
36. South Africa	--	16,046	16,046
37. Russia	--	109,492	109,492
38. United Kingdom	--	51,911	51,911
39. United States	841	222,452	223,293
42. Yugoslavia	--	8,292	8,292
43. Korea	2,352	44,987	47,339
44. Ivory Coast	--	4,196	4,196
45. Nigeria	--	997	997
46. Congo (P. Rep.)	--	5,302	5,302
47. Malaysia	--	150	150
48. Malagasy Republic	--	1,311	1,311
49. Morocco	--	9	9
50. Senegal	--	1,795	1,795
51. Thailand	--	2,311	2,311
52. Turkey	--	637	637
53. Venezuela	--	2,184	2,184
60. Cuba	--	812	812
63. Romania	--	355	355
64. Egypt	--	308	308
68. Greece	--	217	217
71. Tunisia	--	157	157
73. China (P. Rep.)	--	9,139	9,139
75. Mauritania	--	411	411
Totals	7,280	1,339,807	1,347,087



# Bathythermograph Data Base

Table 2. -- Number of bathythermograph observations received by WDC-A, Oceanography, from various nations thru 1997

Nation	No. of cruises	Type of data format				Total
		Mechanical BT		Expendable BT		
		Analog	Tabular	Analog	Tabular	
1. Argentina	79	4,050	3,688	--	603	8,341
2. Australia	683	--	9,460	1	28,234	37,695
3. Belgium	2	--	15	--	--	15
4. Brazil	7	43	85	--	485	613
6. Canada	1,678	21,248	469	--	44,627	66,344
7. Chile	8	846	--	--	165	1,011
8. Colombia	2	316	--	--	--	316
9. Denmark	2	70	--	--	--	70
10. Ecuador	11	--	--	--	405	405
11. Finland	2	124	168	--	--	292
13. France	169	352	--	--	8,480	8,832
14. Germany	395	59	14,258	--	19,537	33,854
16. Ghana	1	12	--	--	--	12
18. Iceland	50	124	7,075	--	--	7,199
19. India	2	--	351	--	522	873
20. Indonesia	13	162	118	--	--	280
23. Italy	24	879	561	72	282	1,794
24. Japan	3,380	--	166,878	--	59,391	226,269
25. Mexico	23	--	--	--	378	378
26. Netherlands	67	675	--	--	3,942	4,617
27. New Zealand	21	--	--	--	1,108	1,108
28. Norway	14	82	158	--	462	702
29. Pakistan	2	--	65	--	--	65
30. Peru	31	--	--	--	970	970
31. Philippines	1	--	--	--	8	8
32. Poland	7	--	153	--	279	432
33. Portugal	24	448	2,725	12	194	3,379
34. Spain	6	194	--	--	225	419
35. Sweden	6	10	57	--	612	679
36. South Africa	2	--	--	--	140	140
37. Russia	115	428	12,395	--	5,388	18,211
38. United Kingdom	1,380	276	44,973	--	17,844	63,093
39. United States	942	36,114	3,489	646	59,997	100,246
43. Korea (Rep. of)	28	--	1,427	--	276	1,703
44. Ivory Coast	6	618	--	--	--	618
45. Nigeria	6	1,011	20	--	--	1,031
46. Congo (P. Rep.)	21	2,389	83	--	--	2,472
48. Malagasy Rep.	10	476	--	--	--	476
50. Senegal	8	730	--	--	--	730
70. Sierra Leone	2	194	--	--	--	194
71. Tunisia	1	--	121	--	--	121
73. China (P. Rep.)	7	--	--	--	620	620
99. Ships of Opportunity (International)	30	--	--	--	6,100	6,100
Total	9,268	71,930	268,792	731	261,274	602,727

# Biological Data Base

Table 3. -- Number of biological observations received by WDC-A, Oceanography, from various nations thru 1997

Nation	No. of cruises	Type of observation				
		Plankton	Primary Productivity	Pigments	C-14	Fishery
1 Argentina	13	452	47	233	129	—
2 Australia	64	1,527	1,599	1,738	—	2,666
4 Brazil	16	754	—	175	—	36
6 Canada	58	1,342	669	1,303	47	100
8 Colombia	7	181	—	496	—	—
10 Ecuador	3	895	191	116	—	—
12 Taiwan	3	98	—	98	—	15
13 France	28	720	288	510	43	92
14 Germany	26	594	238	2,901	1,552	731
19 India	12	424	—	—	—	—
20 Indonesia	61	2,004	5	702	—	7
22 Israel	1	58	—	—	—	—
23 Italy	1	18	18	18	—	—
24 Japan	1,243	43,157	180	24,349	30	7,917
25 Mexico	14	111	13	404	—	—
26 Netherlands	2	150	24	36	—	—
27 New Zealand	1	46	—	69	71	—
29 Pakistan	1	14	—	—	—	—
30 Peru	7	517	3	27	10	12
32 Poland	1	—	—	81	—	—
33 Portugal	5	351	—	128	—	57
34 Spain	7	66	87	175	—	27
35 Sweden	1	—	18	—	—	—
36 South Africa	22	985	165	356	—	—
37 Russia	12	3,837	743	262	—	389
38 United Kingdom	6	416	—	99	—	—
39 United States	315	11,739	5,732	13,567	745	4,445
42 Yugoslavia	1	167	—	—	—	—
43 Korea (Rep. of)	142	20,056	—	—	—	—
44 Ivory Coast	3	27	7	—	—	1
45 Nigeria	6	5	4	—	—	2,018
46 Congo (P. Rep.)	4	24	93	70	—	1
48 Malagasy Rep.	9	84	54	54	—	—
50 Senegal	11	34	—	477	—	258
60 Cuba	1	—	37	—	—	—
63 Romania	10	261	—	—	—	—
64 Arab Rep. of Egypt	2	—	—	—	—	188
71 Greece	1	3	4	—	—	—
73 China (P. Rep.)	2	—	68	139	—	—
75 Mauritania	1	—	—	—	—	1
<b>Total</b>	<b>2,123</b>	<b>91,117</b>	<b>10,287</b>	<b>48,583</b>	<b>2,627</b>	<b>18,961</b>

# Surface and Subsurface Current Data Base

Table 4. -- Number of surface and subsurface current measurements received by WDC-A, Oceanography, from various nations thru 1997

Nation	No. of cruises	Subsurface	Surface
2. Australia	50	1,663	—
4. Brazil	1	83	—
6. Canada	21	1,558	1,052
9. Denmark	62	—	20,184
10. Ecuador	1	46	9
11. Finland	6	5,472	5708
13. France	20	6,450	632
14. Germany	115	10,794	327,348
20. Indonesia	13	177	40
23. Italy	2	782	—
24. Japan	3,628	17,797	191,036
25. Mexico	6	—	6,816
26. Netherlands	21	10,242	—
28. Norway	6	2,691	86
32. Poland	2	291	—
33. Portugal	4	74	—
35. Sweden	116	22,751	24,237
37. Russia	48	20,660	1,507
38. United Kingdom	9	799	258
39. United States	58	4,493	4,940
42. Yugoslavia	25	603	149
43. Korea (Rep. of)	2	—	284
44. Ivory Coast	3	44	140
46. Congo (P. Rep.)	3	218	—
48. Malagasy Rep.	1	24	24
52. Turkey	1	5,095	40
63. Romania	19	284	17
<b>Total</b>	<b>4,243</b>	<b>113,093</b>	<b>584,507</b>

Table 5. Oceanographic station data received through GODAR, 1997

NATION	DATA SET	NO. OF STATIONS
Finland	ICES Station Data Base *	42,431
Japan	1986-1987 OS Cruises	433
Japan	1988 OS Cruises	409
Japan	HAKUHO MARU Cruises	274
Russia	Murmansk Marine Biological Institute	1,028
Russia	State Oceanographic Institute, Sections	5,885
Ukraine	ODESSA Cruises	2,754
United States	Navy Lab	152
United States	US Coast Guard, Historical IIP	1,024

\* Data for a significant number of these stations are new to the WDC-A's Marine Data Base.

Table 6. Bathythermograph observations received through GODAR, 1997

NATION	DATA SET	NO. OF OBS.
France	SISMER	7,954

Table 7. Biological observations received through GODAR, 1997

NATION	DATA SET	NO. OF OBS.
United States	Navy Lab - Plankton	86
United States	Publication No. SSFR723 Plankton	119



Table 8. Oceanographic station data received through NODC, 1997

NATION	DATA SET	NO. OF STATIONS
Argentina	RNODC/SOC 1996 Update	301
Argentina	Various Programs	1,240
Canada	IOS Bottle Data	691
Japan	JARE	300
Sweden	ODEN SD/CTD	106
United Kingdom	BODC CTD	117
United States	MEDDY (Oceanus Cr. 173 leg 2)	425
United States	NYC Harbors Survey	52
United States	JGOFS/EQPAC	366
United States	JGOFS/HOTS 97	640
United States	OCEANUS - Subduction Experiment	158
United States	Southern Cal Bight Study	165
United States	TAMU-OCEANOGRAPHY	695
United States	Ross Sea	344
United States	SCI EX93, University of Washington	20
United States	Coastal Transition Zone	317
United States	FOCI	122
United States	Coastal Jet Separation Experiment	38
United States	AOML	508
United States	CalCOFI Cruises	1,966
United States	Gulf Stream	208
United States	JGOFS/ARABIAN Sea	336
United States	GULFCET	256
United States	FRONTS 88	324
United States	GLOBEC	847

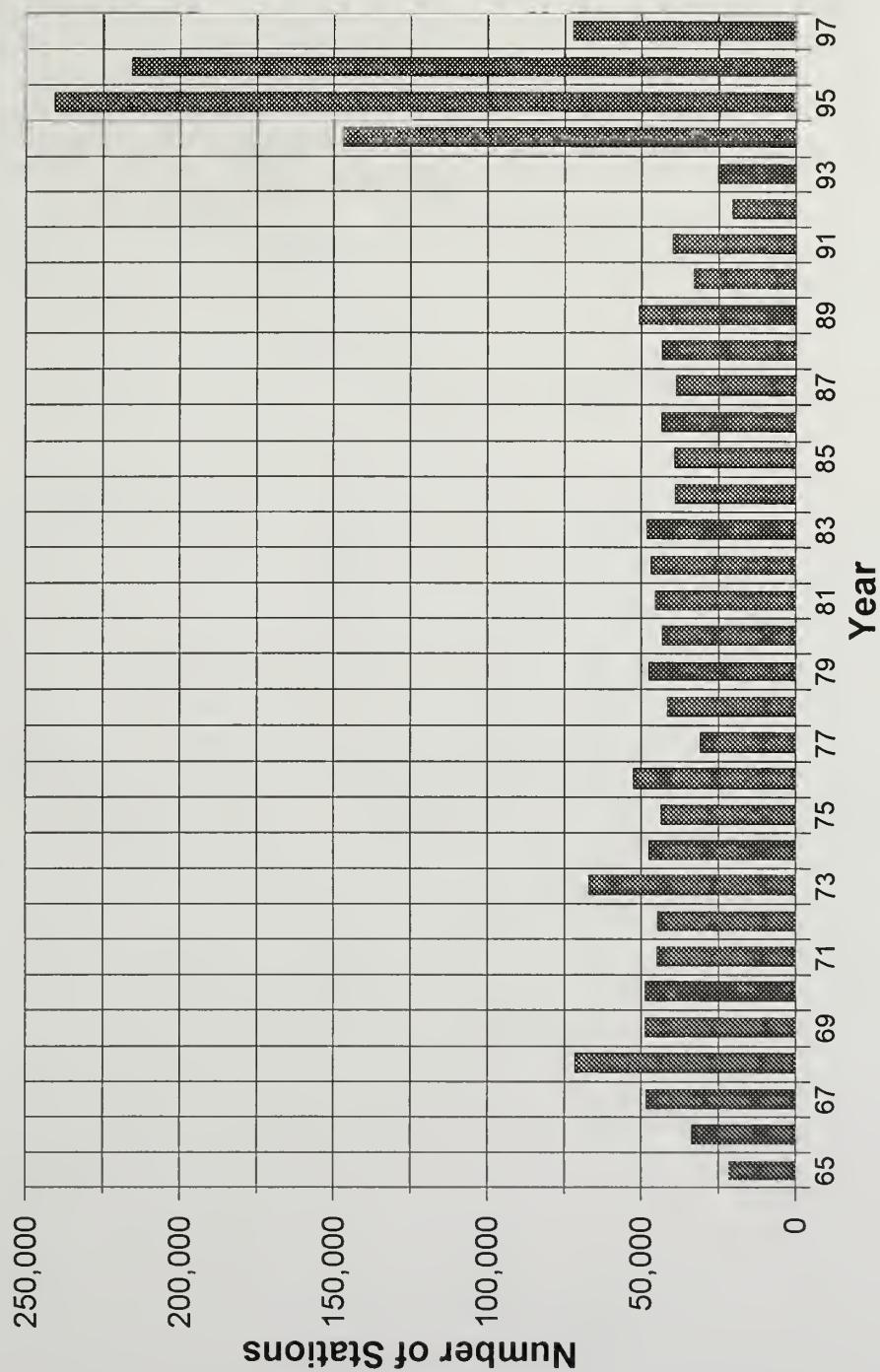
Table 9. Bathythermograph observations received through NODC, 1997

NATION	DATA SET	NO. OF OBS.
Australia	1994 Southern Oceans	1,845
Australia	1995 XBT	3,522
Australia	AODC 1997	197
Australia	CSIRO 1996	5,151
Germany	WOCE - University of Kiel Institute for Marine Science	3,194
Germany	Alfred Wegener Institute for Polar and Marine Research	307
Japan	JMA - Delayed Mode	2,792
United States	ALACE Profiler	1,168
United States	GULFCET	580
United States	SEAS III (JAN 1996 - APR 1997)	93
United States	SEAS IV (APR - NOV 1997)	158
United States	TAMU-OCEANOGRAPHY	707

Table 10. Biological observations received through NODC, 1997

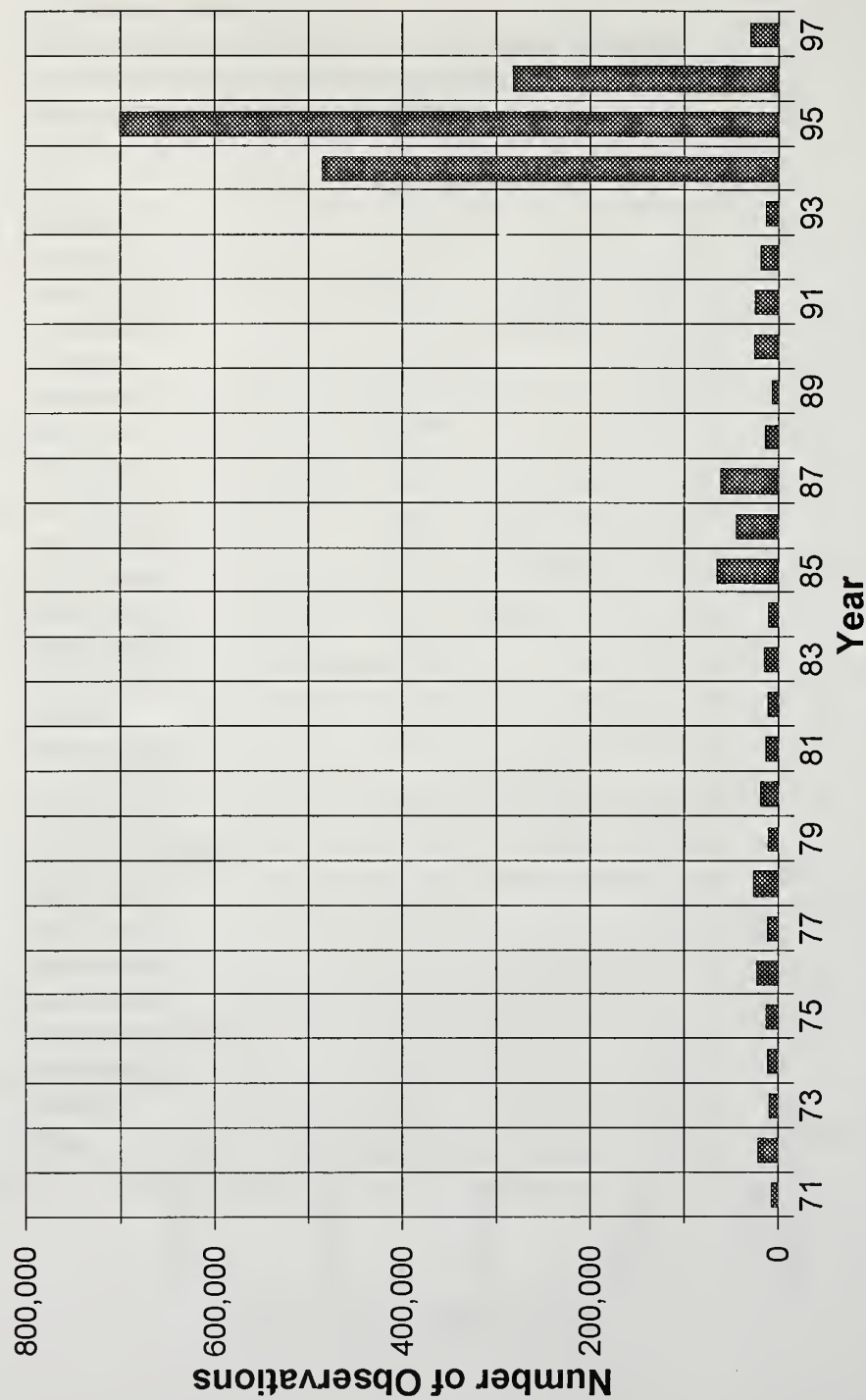
NATION	DATA SET	NO. OF OBS.
United States	Coastal Transition Zone - Primary Prod.	15
United States	FRONTS 88 - Primary Productivity	18
United States	JGOFS/EQPAC - Plankton, Pigments, Primary Productivity	892
United States	JGOFS/HOTS - Primary Productivity	17

# **Number of Oceanographic Stations Received at WDC-A by Year**



1994 through 1997 totals include IOC/IODE/GODAR

# **Number of Bathythermographs Received at WDC-A by Year**



1994 through 1997 totals include IOC/IODE/GODAR



**PART IV**  
**DATA HOLDINGS OF**  
**RNODC's AND**  
**SPECIALIZED DATA CENTERS**



## DATA HOLDINGS of RNODC's and SPECIALIZED DATA CENTERS

This section of the Change Notice provides information on the availability of specialized data sets prepared by the various Responsible National Oceanographic Data Centers (RNODC's) and other Specialized Data Centers. Normally, only those data sets that have actually been received by WDC-A, Oceanography are described in this section; WDC-A can provide digital copies of these data sets either in the originator's format or in the prescribed international exchange format.

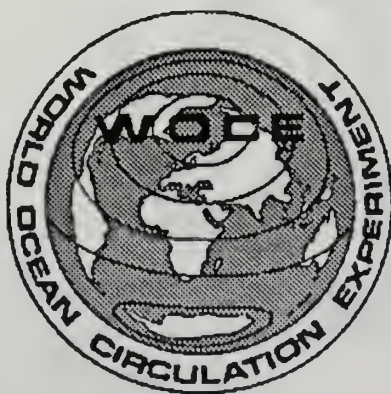
These data products are not described in the usual manner in the Catalogue portion of the Change Notice (except for certain separately-identified cruises that are also included in data sets such as FOY), as the data are not always merged with the standard WDC-A, Oceanography data bases. Thus they constitute a suite of data products, prepared by RNODC's and other Specialized Data Centers, that are separate and distinct from the standard data types regularly catalogued in the Change Notices and normally available from WDC-A.

Such data products are not necessarily intended to be routinely exchanged by the WDC's under normal international data exchange guidelines. They may be voluminous or costly to prepare and, thus, may be precluded from regular data exchanges between WDC's and their exchange cooperators. Data sets in automated form are available from the WDC's usually at a cost not to exceed the cost of reproduction and postage.

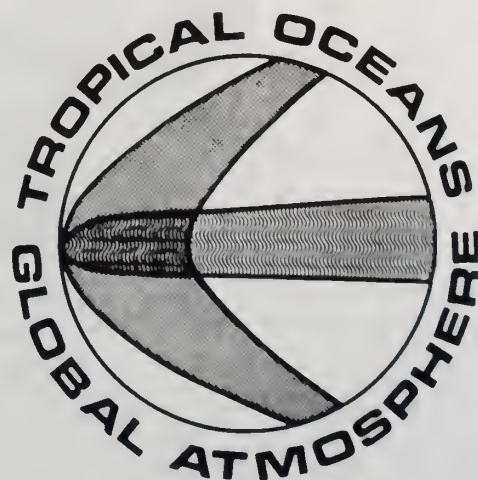
**MEDALPEX**



**IGOSS**



**SOC**





## FGGE OPERATIONAL YEAR GLOBAL OCEAN CLIMATE DATA BASE

The Global Ocean Climate Data Base is available from the National Oceanographic Data Center (NODC) which served as the Responsible National Oceanographic Data Center for the FGGE\* Operational Year (RNODC/FOY). The Global Ocean Climate Data Base is a collection of oceanographic data submitted to NODC by 17 different countries. Although the formal FGGE Operational Year was from 1 December 1978 to 30 November 1979, the data set covers the extended FOY period from 1 September 1978 to 29 February 1980.

The data base includes four types of data: (1) oceanographic hydrocast (bottle) data, (2) conductivity/ salinity-temperature-depth (C/STD) data, (3) expendable bathythermograph (XBT)

data, and (4) Eulerian current (current meter) data. The data are recorded on magnetic tape in two different formats: (1) the Intergovernmental Oceanographic Commission General Exchange Format 3 (GF3) and (2) NODC archive formats (different format for each of the four types of data). In GF3 the data base comprises eight magnetic tapes; in the NODC formats the data base comprises four tapes.

The FGGE Operational Year was the culmination of a series of international ocean/atmosphere research programs conducted in the 1970's. This effort, in turn, was a steppingstone toward the increasingly ambitious and large-scale research and monitoring programs of the 1980's and 1990's that are directed toward fuller understanding of tropical dynamics and their influence on global ocean/atmosphere phenomena.

*\*FGGE = First GARP Global Experiment, also known as the Global Weather Experiment.  
GARP = Global Atmosphere Research Program.*





## The FGGE/FOY Data Base

The FGGE/FOY Global Ocean Climate Data Base compiled by the RNODC contains: 10,413 Oceanographic hydrocast (bottle) stations; 4,030 CTD/STD casts; 28,733 expendable bathythermograph (XBT)

temperature profiles; and 294 months of time-series data from current meter moorings. The sources of these data are summarized in Table 1.

Table 1. FGGE Operational Year Global Ocean Climate Data Base				
Country	Data Type			
	Oceanographic Stations (stations)	CTD/STD (stations)	XBT (stations)	Current Meter (meter-months)
Australia	--	--	2,754	--
Canada	324	--	507	--
People's Republic of China	318	--	--	--
Republic of the Congo	307	--	--	--
France	--	--	307	--
German Democratic Republic	74	--	--	--
Federal Republic of Germany	--	--	1,366	--
Ghana	335	--	--	--
Italy	--	--	55	--
Japan	1,138	--	832	--
Philippines	--	--	8	--
Poland	87	--	267	--
Republic of South Africa	--	--	56	--
Spain	--	--	180	--
UK	--	64	944	--
USA	1,271	3,966	20,727	294
USSR	6,559	--	730	--
<b>TOTAL</b>	<b>10,413</b>	<b>4,030</b>	<b>28,733</b>	<b>294</b>

Table 2 lists the number of tapes included in the data set. Customers may order the entire set of

tapes or only the tape(s) for one or more of the four different data types in either of the two format options.

<b>Table 2. FOY Global Ocean Climate Data Tapes</b>			
<b>Data Type</b>	<b>Data Quantity</b>	<b>Number of Tapes</b>	
		<b>GF3 Format (1600 bpi)</b>	<b>NODC Format (6250 bpi)*</b>
Oceanographic Station (hydrocast)	10,413 stations (128 cruises)	2	1
CTD/STD	4,030 stations (62 cruises)	1	1
XBT	28,733 stations (571 cruises)	3	1
Current Meter	294 months (27 meters)	2	1
<b>TOTAL</b>		<b>8</b>	<b>4</b>
<i>*Data tapes in NODC archive formats are also available by special request in 1600 bpi density</i>			

## Data Availability

Magnetic tape copies of the FOY Global Ocean Climate Data Base are available from the RNODC in either GF3 format or in NODC archive formats. Magnetic tape characteristics are: (1) GF3 format -- 9 track, 1600bpi, ANSI/ASCII, non-labeled, record length = 1920, unblocked; (2) NODC formats -- 9 track, 6250 bpi, ANSI/ASCII, non-labeled, variable record length, maximum blocksize = 4,160 (oceanographic station and CTD/STD data), 2,600 (XBT data), and any multiple of 60 (current meter data).

Complete sets of tapes or individual tapes are available at the cost of tape reproduction from:

World Data Center A, Oceanography  
NOAA  
Silver Spring, MD 20910-3282, USA

Telephone: 301-713-3295  
FAX: 301-713-3303  
Electronic mail: wdca @ nodc.noaa.gov  
(Internet).

# ***RNODC MEDALPEX (Sea Level)***

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## **MEDITERRANEAN ALPINE EXPERIMENT SEA LEVEL DATA SET**

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In 1975, the IOC decided to support the development of an oceanographic program in the Mediterranean during the GARP Alpine Experiment (ALPEX). The MEDALPEX project took place between 1 September 1981 and 30 September 1982, with a special period of observation from 15 February 1982 to 30 April 1982. It was a multi-national project involving scientists from 7 countries.

The main purpose of MEDALPEX was to increase understanding of the effect of wind forcing on the dynamics of the western part of the Mediterranean Basin. Specific studies were undertaken, each having a particular scientific objective including:

1. The interrelationship between the general circulation and mesoscale eddies
2. Offshore dynamic response mechanisms under severe weather conditions
3. Storm surges and the piling up of water, especially in the Adriatic and Ligurian seas

The measurement of sea level was considered to be an important component of the observation program to support these studies. A wide range of other types of oceanographic data were also collected, including classical and synoptic meteorological measurements, data collected using remote sensing techniques and data from current meters, thermistor chains, waverider buoys, CTDs and XBTs.

The Permanent Service for Mean Sea Level (PSMSL) was requested by IOC to fulfil the role of the Responsible National Oceanographic Data Center for the MEDALPEX sea level data. The work was under-taken on behalf of PSMSL by the Marine Information and Advisory Service (MIAS) - U.K.'s national oceanographic data center (now the British Oceanographic Data Centre.)

Sea level data were submitted to MIAS from 29 of the 40 MEDALPEX sites. An inventory of the data is given on the following page. Measurements from 28 of the sites were taken using conventional stilling wells and, with one exception, were supplied to MIAS as hourly values. Data from the remaining site, off the coast of Corsica, were collected by an Aanderaa water level recorder at half-hourly intervals.



**INVENTORY OF DATA RECEIVED**  
**BY MEDALPEX SEA LEVEL DATA CENTER**

SITE	LATITUDE	LONGITUDE	START DATE	SERIES DURATION	CYCLE INTERVAL
	DDD MM.MH	DDD MM.MH	DD/MM/YY	WEEKS	SECS
CADIZ	36 32.0N	6 17.0W	01/09/81	56	3600
TARIFA	36 0.0N	5 36.0W	01/09/81	56	3600
GIBRALTAR	36 8.0N	5 21.0W	01/09/81	56	3600
CEUTA	35 54.0N	5 19.0W	01/09/81	56	3600
ALGECIRAS	36 7.0N	5 26.0W	01/09/81	56	3600
PUERTOS BANUS	36 37.0N	4 55.0W		NO DATA	
MALAGA	36 43.0N	4 25.0W	01/09/81	56	3600
ALMERIA	36 49.7N	2 29.2W	14/08/81	58	3600
CARTEGENA	37 36.0N	0 59.0W		NO DATA	
ALICANTE I	38 20.3N	0 30.4W	23/08/81	60	3600
ALICANTE III	38 20.3N	0 30.7W	28/08/81	60	3600
PALMA DE MALLORCA	39 33.0N	2 38.0E	01/09/81	56	3600
BLANES	41 41.0N	2 48.0E		NO TIDE GAUGE	
ROSAS	42 15.0N	3 11.0E		NO TIDE GAUGE	
PORT VENDRES	42 31.0N	3 6.0E	28/12/81	39	3600
SETE	43 25.0N	3 43.0E		NO DATA	
FOS	43 25.0N	4 46.0E		NO DATA	
TOULON	43 7.0N	5 55.0E	30/08/81	56	3600
NICE	43 42.0N	7 16.0E	03/07/81	68	3600
MONACO	43 44.0N	7 25.0E	29/06/81	69	3600
OFFSHORE	42 34.8N	8 44.0E	06/04/82	18	1800
NEAR CALVI	42 34.8N	8 44.0E	29/07/82	9	1800
AJACCIO	41 55.0N	8 43.0E	30/08/81	49	3600
CAGLIARI	39 13.0N	9 8.0E		NO DATA	
SAVONA	44 18.0N	8 28.0E		NO DATA	
GENOVA	44 24.0N	8 54.0E	31/08/81	58	3600
LA SPEZIA	44 7.0N	9 48.0E		NO DATA	
LIVORNO	43 33.2N	10 18.2E	31/08/81	49	3600
CIVITAVECCHIA	42 5.7N	11 47.4E	25/08/81	22	3600
NAPOLI	40 50.4N	14 16.2E	31/08/81	56	3600
PALERMO	38 8.0N	13 23.0E		NO DATA	
ANCONA	43 37.0N	13 31.0E	01/09/81	56	3600
PTO CORSINI	44 35.0N	12 20.0E		NO DATA	
VENEZIA	45 26.0N	12 20.0E	01/01/81	104	3600
KOPER	45 33.0N	13 44.0E	28/02/82	9	3600
ROVINJ	45 5.0N	13 38.0E	28/02/82	9	3600
BAKAR	45 18.0N	14 32.0E	28/02/82	9	3600
ZADAR	44 5.4N	15 16.3E	28/02/82	9	3600
NOVALJA	44 33.3N	14 13.2E	28/02/82	9	3600
SPLIT	43 30.0N	16 26.0E	28/02/82	9	3600
DUBROVNIK	42 40.0N	18 4.0E	28/02/82	9	3600
BAR	42 5.0N	19 5.0E	28/02/82	9	3600



In compiling the dataset, MIAS translated all incoming data into a common format with elevation values standardized to meters and times to GMT. The data for each site were plotted as a time series and checks were carried out for gaps or constant values, spikes, spurious data or punching errors. Further checks were carried out by tidally analyzing and low pass filtering the data. Non-tidal fluctuations were investigated using principal component analysis. Qualifying information applicable to the data from each site was checked for inconsistencies and completeness, and appropriate documentation was stored with the data in the form of plain language records. The complete quality controlled dataset, including documentation, is available as a single magnetic tape formatted in GF3, the IOC's standard format for the exchange of oceanographic data. A copy of the magnetic tape may be obtained at a cost not to exceed the cost of reproduction and postage from:

World Data Center A, Oceanography  
NOAA  
Silver Spring, MD 20910-3282  
U.S.A.

Electronic mail: [wdca @ nodc.noaa.gov](mailto:wdca@nodc.noaa.gov) (Internet)

or

RNODC/MEDALPEX Sea Level Data  
BODC  
Bidston Observatory  
Merseyside L43 7RA  
U.K.

Electronic mail: [bodcmail @ ua.nbi.ac.uk](mailto:bodcmail@ua.nbi.ac.uk) (Internet)

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## **RNODC FOR DRIFTING BUOYS**

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### Background

The Marine Environmental Data Service (MEDS) began operation of the RNODC/Drifting Buoy Data in January 1986. The RNODC acquires Drifting Buoy Data from worldwide sources, makes the data available to international scientific programs, and prepares geographical plots of Drifting Buoy locations and tracks for the world oceans on a monthly basis. The RNODC also provides monthly statistics of operational buoys and the number of messages received from them.

### Acquisition of Drifting Buoy Data

There are three procedures by which Drifting Buoy Data are received by the RNODC. The first and more traditional is for the principal investigator to submit his data directly to the RNODC, or to his National Oceanographic Data Centre which in turn submits the data to the RNODC. For historical data sets, this is the only option available. Data received in this way are usually of the highest quality, since they have undergone the most discriminating calibration and quality control procedures under the direction of the principal investigator; however, data entering the system in this manner are not sufficiently timely to meet the operational requirements of the major global science programs.

The second path for data flow to the RNODC is via the GTS. An advantage of this procedure is that the data are available in time scales suitable for the operational requirements of researchers in programs such as TOGA and WOCE, as well as for other operational users such as meteorological forecasters. Data received in this way may be less accurate, because they have not been fully reviewed and assessed by the principal investigator. For drifting buoy data, there is also a problem in that using the DRIBU format on the GTS for some buoys may limit the data that can be transmitted, because of a requirement to restrict the information to 256 bits.

A third procedure involves retrieving the DRIBU data as they pass through Services ARGOS. Although these data still have not been reviewed and assessed by the principal investigator, they are an improvement over the GTS data in that both time of observation and position time are available to improve velocity calculations. Data received by Service ARGOS are stored on magnetic tape for a period of 90 days. After this time, the tapes are reused and the data then reside solely in the hands of the principal investigators. Canada and the United States have

agreed to share the cost of buying copies of these tapes for the RNODC. Data from a buoy can only be provided to the RNODC if the principal investigator has given consent in writing.

### RNODC/Drifting Buoy Data Base

MEDS utilizes a hierarchical database, called System 2000, to store the drifting buoy data; because of the volume of data, each year of data is stored in its own data base. In order to provide services to users at all time scales and to have available at each time scale the best data possible, the RNODC has decided to accept all data using the following hierarchical guidelines:

1. Where possible, Principal Investigators are requested to make their data available to other operational users and to the RNODC by having the data transmitted on the GTS. The RNODC will copy all available data from the GTS, quality control it, and update it into the data base on a weekly basis.
2. Principal Investigators are also requested to agree to have Service ARGOS provide a copy of their data to MEDS via tape each month whether or not those data have already been on the GTS. The data circulated on the GTS have only the one time included which poses a difficulty in calculating velocities. Thus, the tape data with the two times is an improvement to the database and will be used to replace the GTS data in the database. In addition, data will be picked up which could not be circulated on the GTS because of the format of the transmission from the buoy.

If Service Argos has not already been supplied with the calibration constants, channel allocations, and algorithms, or has not been requested to make the conversions to physical units, there will be a requirement for the RNODC to obtain this information from the principal investigators. Principal investigators are reminded that if the sensor data cannot be made available, the position data itself is of value for the database.

3. Principal Investigators are requested to provide a copy of their Drifting Buoy Data either directly to the RNODC when the fully processed, quality controlled version is available, or to provide the data to their National Oceanographic Data Centre, where the RNODC will be requesting such data on a regular basis. Data received by this path will replace GTS or Service ARGOS versions of the data in the database.

By receiving data in the configuration set forth above, and replacing earlier, lower quality data as higher quality versions of the data arrive, the RNODC can offer



users a choice between timeliness and quality, as dictated by their particular requirements.

The RNODC recognizes that in some cases there exists a need to restrict distribution of data to protect a scientist's right to benefit first from collection activities carried out at considerable effort and cost. It is noted that the large international experiments generally have data exchange agreements that state when the data are available to other participants and to those outside the program. The RNODC will honor such data exchange agreements and will, at a scientist's request, restrict further distribution of the data according to the terms of the pertinent agreement. In regard to data from individual scientists, bilateral agreements on further distribution of data for a period of up to two years can also be made

### RNODC Services

As mentioned earlier, the RNODC maintains its drifting buoy data in a data base structure. This provides maximum flexibility when meeting a request. While a number of different qualifiers may be used to retrieve data, the most common are area and time. Requesters may also specify all data or only those which have passed the quality control procedures. On output, the data can be written to magnetic tape in a standard subset of the GF3 formatting system or in some other agreed ad hoc character format, if appropriate. In choosing the data format, users should be aware that the GF3 Formatting System is supported by a powerful and growing software system which is available for many of the more widely used host computers.

Each month, the RNODC publishes a summary of the data it has received in real time; also produced are global maps of drifting buoy tracks for the previous month. These maps are issued regularly on a monthly basis. Anyone wishing to receive this summary, should contact the RNODC. There is no charge to receive this product.

To obtain the RNODC Drifting Buoy Data Set, requesters should contact one of the following:

RNODC for Drifting Buoy Data  
Marine Environmental Data Service  
Department of Fisheries and Oceans  
200 Kent Street  
Ottawa K1A 0E6 Canada

Telephone: 613-990-0268  
Telex: 053-4428  
Email: wilson @ ottmed.meds.dfo.ca  
(Internet)

World Data Center A,  
Oceanography  
NOAA  
Silver Spring, MD 20910-3282  
U.S.A.

Telephone: 301-713-3295  
FAX: 301-713-3303  
Email: wdca @ nodc.noaa.gov  
(Internet)



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## TROPICAL OCEAN and GLOBAL ATMOSPHERE PROGRAMME

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### TOGA Background

A major component of the TOGA International Implementation Plan is the monitoring of the global atmosphere and the upper layers of the three tropical oceans during the ten-year period of 1985-1994. Existing meteorological and oceanographic observation systems have been maintained and expanded by TOGA while new networks have been installed in key locations. These observations along with available historical data will provide a description of the ocean-climate system and its variability from sub-seasonal to interannual scales.

### TOGA Tropical Subsurface Data Centers

The TOGA Tropical Subsurface Data Centre in Brest, France operates within the framework of both the IOC's International Oceanographic Data and Information Exchange (IODE) system and the Joint IOC-WMO Integrated Global Ocean Services System (IGOSS). The Centre collects subsurface ocean observations for the tropical oceans (30°N-30°S) from the following sources: (1) tropical oceans observations from the IGOSS network; (2) additional vertical temperature profiles from XBT's and from drifting or moored buoys with thermistor chains, not sent over the GTS; (3) time series of temperature and salinity at fixed depth from moored thermistor chains; (4) surface temperature and salinity data and vertical profiles of temperature and salinity from CTD's, bottle casts, and WCTD's; and (5) other subsurface ocean measurements from process-oriented intensive oceanographic observation projects in the tropical oceans.

Initially, data are collected from radio transmissions, with fully digitized and quality controlled observations added with time. The subsurface thermal data described above are analyzed, and the Centre produces quality-controlled Level II-B data sets for the tropical Atlantic and Indian Oceans for the ten-year period (1985-1994). The Centre is also responsible for provision of these data sets to the World Data Centers, Oceanography at appropriate intervals.



WDC-A, by virtue of its collocation with the U.S. National Oceanographic Data Center (NODC), also has access to the Tropical Pacific Ocean data set jointly maintained by NODC and the Scripps Institution of Oceanography (SIO), serving as the Joint Environmental Data Analysis (JEDA) Center. JEDA tracks, acquires, quality controls, and merges all available subsurface thermal data for the Tropical Pacific. NODC assembles, reformats and initiates quality control of the data; SIO performs further quality control and analysis of the data. Each yearly Level II-B Pacific Ocean data set undergoes the full spectrum of quality control and analysis by the JEDA Center; it is then provided to WDC-A.

### TOGA Sea Level Center

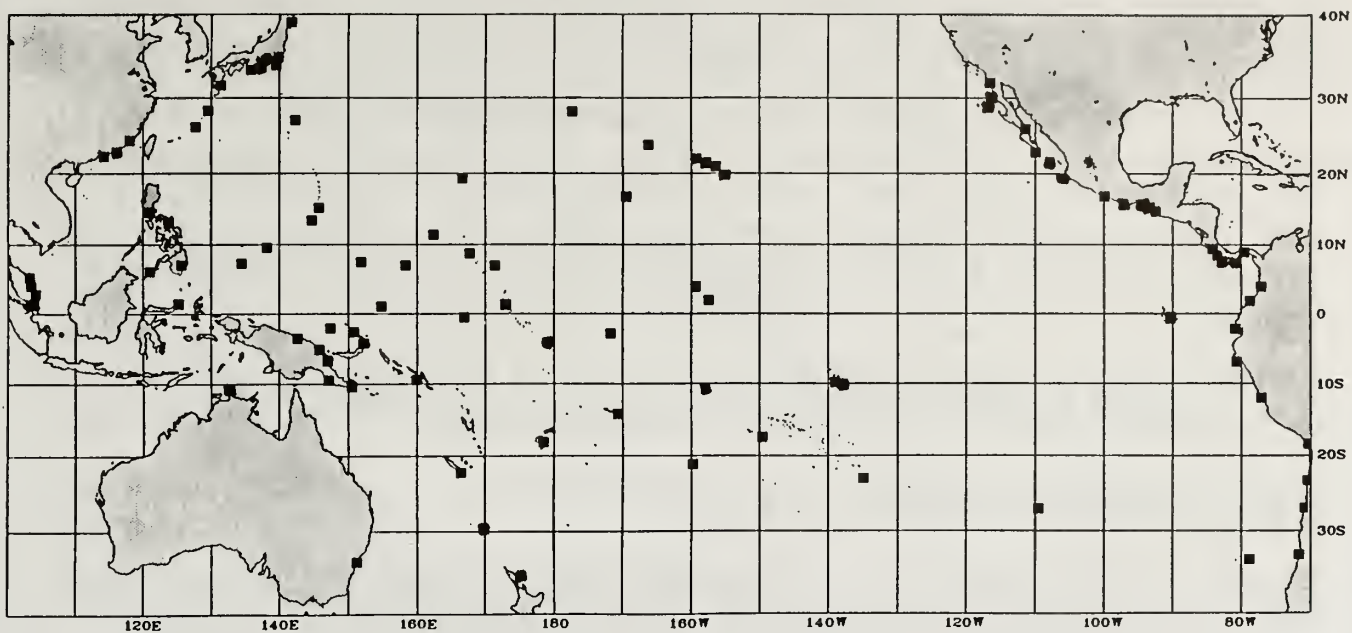
The TOGA Project, realizing the importance of sea level data for research in ocean dynamics and for the monitoring and prediction of oceanographic processes, established a TOGA Sea Level Center at the University of Hawaii. The purpose of this Center is to collect all sea level data taken by island-based and coastal tide gauges in the area between 30°N and 30°S during the TOGA project, and to make them available for research. The TOGA Sea Level Center also obtains and archives past sea level data for the same region, when they are made available from the originators. Hourly, daily, and monthly values are prepared and archived, the data are stored digitally and are passed on yearly to other TOGA data centers, to the Permanent Service for Mean Sea Level (PSMSL), and to the World Data Centers, Oceanography. The TOGA Sea Level Center also supports the Global Sea Level Observing System (GLOSS). Sea level data has assumed greater importance because of its utilization in the calibration of satellite altimeters, such as GEOSAT.

Through the creation of the Joint Archive for Sea Level (JASL) with the University of Hawaii, the U.S. NODC is providing data management for this effort and assisting in the acquisition, processing, quality assurance, archiving, and dissemination of the data. The Joint Archive for Sea Level submits sea level time series data updates to NODC on a yearly basis. These updates may include data from new stations, as well as previously unprocessed data from existing stations. In addition, the updates may include data previously submitted to NODC that have been reprocessed to improve data quality. Therefore, to update the sea level data files for a station already in the database, NODC completely replaces the time series of data for that station with a new version that may include both new and reprocessed data.

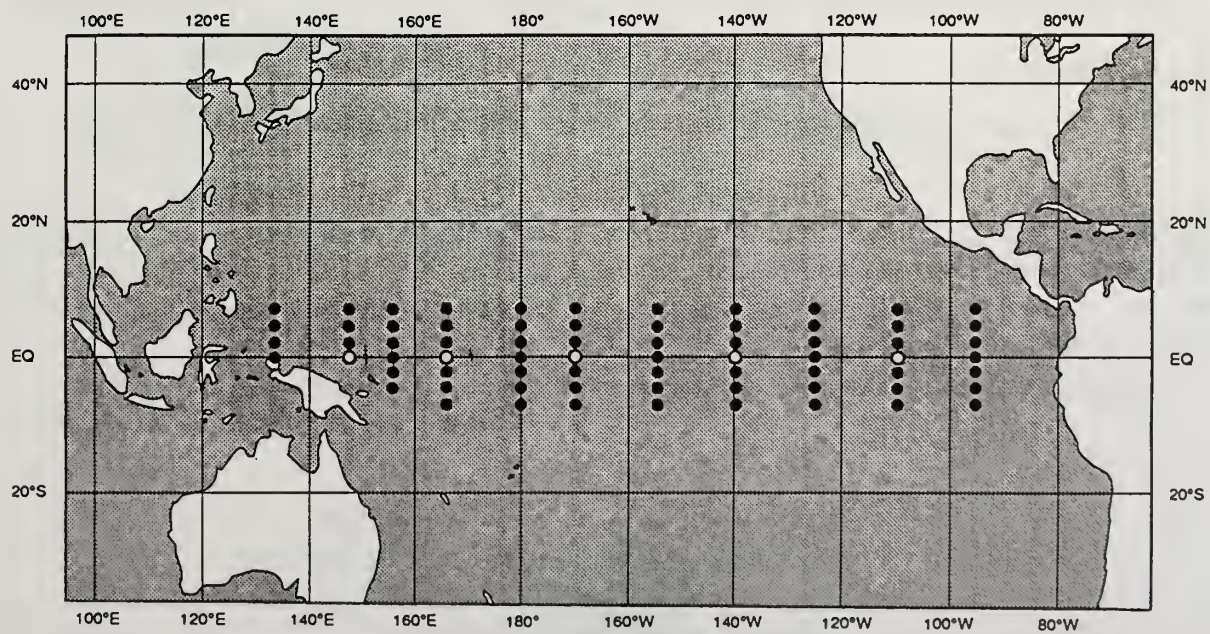
### TOGA TAO Array

The TOGA TAO (Tropical Atmosphere Ocean) Array provides measurements of surface winds, air temperature, humidity, SST, upper-ocean temperatures and currents. This array of approximately 70 moorings was established by TOGA in the Equatorial Pacific. The array is comprised of the ATLAS (Autonomous Tem-





Pacific Ocean sea-level stations with quality-controlled data in the JASL archive



Pacific Ocean TOGA "Tropical Atmosphere Ocean" (TAO) array

perature Line Acquisition System) wind and thermistor chain moorings and the PROTEUS (PROfile TElemetry of Upper ocean currentS) downward-looking Acoustic Doppler Current Profiler (ADCP) current measurement system. For the ATLAS moorings, surface winds, air temperature, humidity, SST, and sub-surface temperature at 10 depths down to 500 m are telemetered to shore via Service Argos several times a day, and for PROTEUS, daily-averaged velocity profiles with 8 m vertical resolution between 10 - 250 m are telemetered to shore in real time via Service Argos. TAO Arrays are also planned for the other Tropical Oceans.

NODC receives periodic updates to the TOGA TAO Array data set; WDC-A provides updates of this data set to its counterpart WDCs.

#### WDC-A, Oceanography Support to TOGA

WDC-A, Oceanography serves as an archival center for each of these TOGA Data Sets. Its responsibilities are to provide TOGA data sets to requesters in the international scientific community, at a cost not to exceed that of data reproduction and postage, and to provide copies of all TOGA data sets received to World Data Centers B and D, Oceanography in exchange. TOGA data and information are available from the following TOGA specialized Data Centers:

TOGA Subsurface Data Centre  
Centre IFREMER de Brest  
BP 70  
29263 Plouzane  
France

JEDA Center  
Scripps Institution of Oceanography  
University of California  
La Jolla, CA 92093 U.S.A.  
Email: [wbwhite@ucsd.edu](mailto:wbwhite@ucsd.edu)

JEDA Center  
National Oceanographic Data Center  
NOAA  
Silver Spring, MD 20910-3282 U.S.A.  
Email: [mhamilton@nodc.noaa.gov](mailto:mhamilton@nodc.noaa.gov)

The Joint Archive for Sea Level  
c/o The TOGA Sea Level Center  
University of Hawaii - MSB 316  
1000 Pope Road  
Honolulu, Hawaii 96734 U.S.A.  
Email: [caldwell@nodc.noaa.gov](mailto:caldwell@nodc.noaa.gov)

World Data Center A, Oceanography  
National Oceanic & Atmospheric Admin.  
Silver Spring, MD 20910-3282 U.S.A.  
Email: [wdca@nodc.noaa.gov](mailto:wdca@nodc.noaa.gov)



# ***RNODC SOC***

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## **SOUTHERN OCEANS DATA SET**

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The RNODC/Southern Oceans (RNODC/SOC) was created in order to provide a regional data management and data information service for Southern Oceans physical and chemical oceanographic data. The RNODC was created under guidelines set forth in Recommendation XII.1 by the IOC's Technical Committee on International Oceanographic Data Exchange (IODE XII, Moscow 10-17 December 1986).

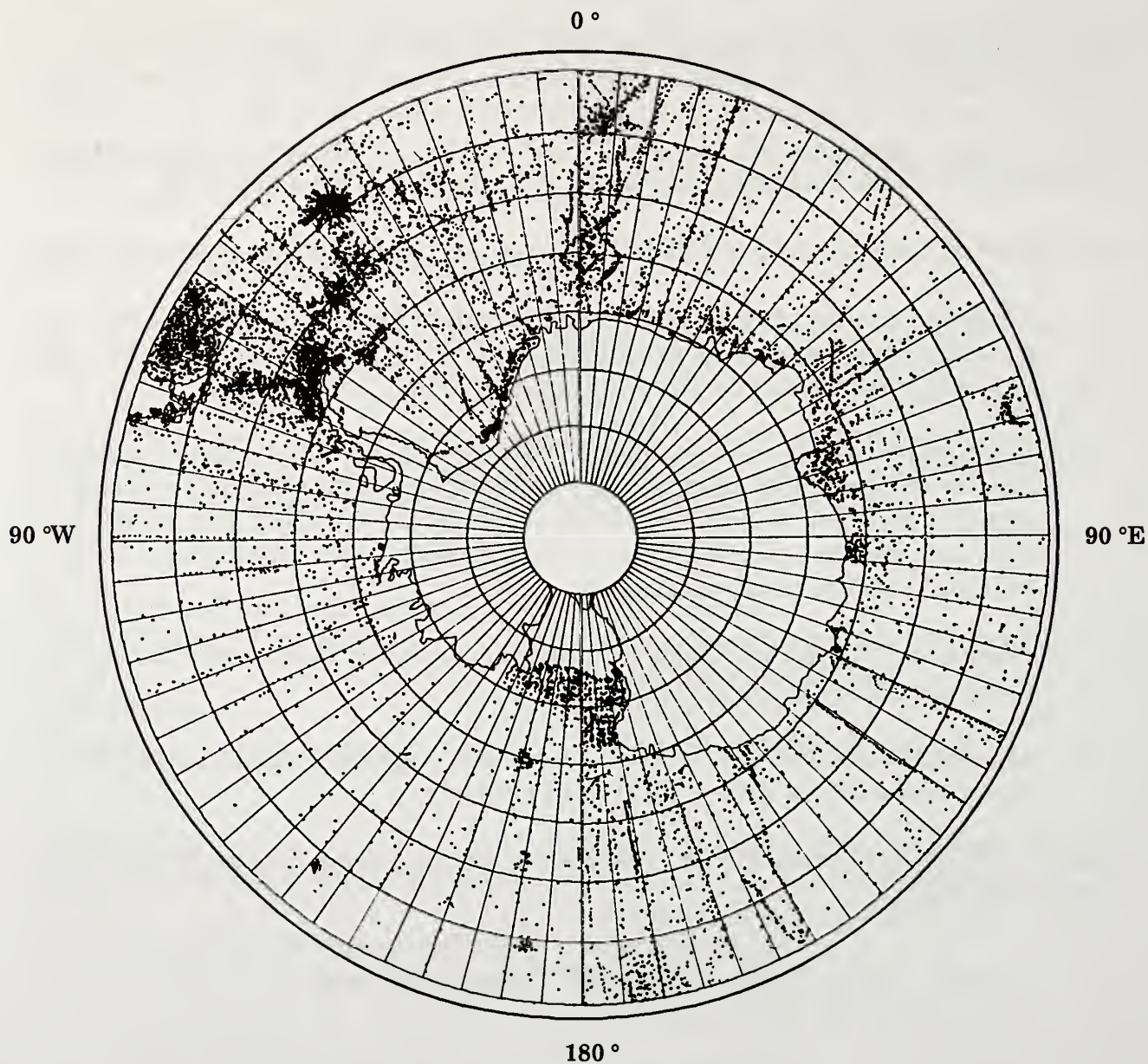
The Terms of Reference of the RNODC/SOC include the following responsibilities:

- Acquire, quality control, and store in standard format the physical and chemical data obtained by the international community from the cruises and research programmes carried out in the Southern Oceans;
- Co-operate closely with the World Data Centers, Oceanography by sending regular shipments (at least once a year), free of charge, of complete sets of physical and chemical data stored on magnetic tapes in GF3, and inventories, data summaries, and other data products related to the physical and chemical data from the Southern Oceans;
- Assist the World Data Centers by sending copies to them of any ROSCOP forms submitted to the RNODC-SOC;
- Co-operate with the BIOMASS Data Center, regarding exchange of data and inventories, as well as other data products.

The RNODC-SOC is located in and operated by the Argentine Oceanographic Data Center (CEADO).



## SOUTHERN OCEANS OCEANOGRAPHIC STATION PLOT



This plot shows the locations of 14,271 oceanographic data observations made in the Southern Oceans and registered in the RNODC/SOC master data file.

## RNODC/SOC Oceanographic Data Set

The RNODC/SOC data set contains data for all available oceanographic stations for the Southern Oceans between 50° and the Antarctic Continent. Data for a total of 14,271 oceanographic stations taken during 363 Southern Oceans cruises are included in the data set. Seasonally, the data totals are approximately 2,200 observations taken during the Austral Winter (April-September) and more than 12,000 observations taken during the Austral Summer (October-March). Southern Oceans observational data taken by 19 countries have been received by the RNODC.

The RNODC/SOC data set is available from:

Argentine Oceanographic Data Center (RNODC/SOC)  
Centro Argentino de Datos Oceanograficos  
Ave. Montes de Oca 2124  
1271 - Buenos Aires  
Republica Argentina

Email: [postmaster@ceado.edu.ar](mailto:postmaster@ceado.edu.ar)

or

World Data Center A, Oceanography  
National Oceanic & Atmospheric  
Administration  
Silver Spring, MD 20910-3282 U.S.A.

Email: [wdca@nodc.noaa.gov](mailto:wdca@nodc.noaa.gov)



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## **INTEGRATED GLOBAL OCEAN SERVICES SYSTEM DATA SET**

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### Background

The Integrated Global Ocean Services System (IGOSS) is a worldwide system for the rapid collection, exchange and analysis of oceanographic data and the timely preparation and dissemination of ocean products and services. IGOSS was established to support oceanographic and meteorological research efforts by providing: (1) a global distribution of oceanographic observations, (2) a mechanism for the timely and effective exchange of data, and (3) the preparation of oceanographic analysis products capable of supporting global change and climate research studies. IGOSS products and services can be useful for input to large scale circulation models, for research survey planning, and for direct application in commercial fisheries, recreation, commercial shipping, and search and rescue efforts. Real-time ocean products currently available include sea surface and subsurface temperature analyses and graphical depictions of mixed layer depths and ocean frontal positions. Additional analyses and data summaries available as delayed-mode products include: (1) ocean currents, (2) salinity, (3) distribution of pollutants, and (4) weekly and monthly temperature means. The IGOSS data are BATHY (profiles of temperature with depth) and TESAC (temperature/salinity/current profiles with depth).

The major operational elements of the IGOSS program are: (1) observing system, (2) data processing and services system, (3) telecommunication arrangements, (4) marine pollution monitoring, and (5) data archival and exchange. The organizational structure of the IGOSS data processing and services system consists of World Oceanographic Centers in Moscow and Washington and National and Specialized Oceanographic Centers in participating nations. Data from all cooperating nations are combined in standard formats at the World Oceanographic Centers, and then used as input to global and hemispheric analyses for improved weather forecasting, global climate studies, and a variety of products for oceanographic research uses. National Oceanographic Centers provide quality control for data from their country entering the international exchange system via a high speed global telecommunications link called the Global Telecommunication System (GTS) of the World Weather Watch.



# **IGOSS**



Long-range data exchange and service arrangements and long-term archival activities for IGOSS data are performed by National Oceanographic Data Centers in Japan, the U.S.S.R., and the United States. These NODC's, serving as Responsible National Oceanographic Data Centers (RNODC's) for IGOSS, compile archives of IGOSS data and products, assume responsibilities for specified regions of the world oceans, and deal with problems of quality control. They maintain geographically sorted, updated files of observations received via the GTS.

#### RNODC's/IGOSS Terms of Reference

The terms of reference for RNODC's/IGOSS are as follows:

1. Acquire BATHY and TESAC datasets and sub-surface temperature data from drifting and moored buoys from IGOSS Specialized Oceanographic Centres (SOC) for area of responsibility; apply supplementary quality control to acquired data and provide services to users after 30 days from receipt of that data;
2. Acquire non-operational BATHY, TESAC, and sub-surface temperature data from drifting and moored buoys and/or datasets for area of responsibility; apply quality control on non-operational data, prepare integrated datasets, and provide services to users;
3. Maintain a data base and inventories for areas of responsibility;
4. Prepare products based on operational and non-operational IGOSS data, as appropriate; also, archive and make available to users, selected data products provided by SOC's and analysis centres;
5. Provide for exchange of IGOSS data with other RNODC's or to other users as requested;
6. Transmit datasets, inventories of archived data, and selected data products to the WDCs annually;
7. Provide for exchange of documentation and software regarding quality control and processing procedures, with other RNODC's, as possible;
8. Participate in efforts to monitor data flow, and participate, as feasible, in IOC training programmes;
9. Prepare inventories of available data sets of the RNODC's area of interest and transmit them to the IOC Secretariat semiannually.



### RNODC/IGOSS - Japan

The RNODC/IGOSS-Japan is operated by the Japan Oceanographic Data Center (JODC), with support from the Japan Meteorological Agency (JMA), which serves as a Specialized Oceanographic Center (SOC) for IGOSS. At the SOC, systematic quality control of the collected BATHY/TESAC reports is made. The SOC compiles the IGOSS monthly summaries including maps showing the geographical distribution of BATHY/TESAC messages and numbers of messages of individual ships and sends them to the Secretariat of the IOC.

IGOSS data submitted by the SOC are stored in three formats at the RNODC/IGOSS. The first includes the original data file compiled on a semiannual basis. This file contains the collected and processed data from the GTS and other operational sources within the area of responsibility. The second contains the data and data inventory files recorded in a form of the SYNDARC Format, and is available to users as computer-generated data summaries, statistical presentations, and graphical plots, or in a medium which allows the user to further process the data using a personal computer. During the conversion process, minimum quality control procedures are applied to the original data based on IOC Manuals and Guides No. 3. The third is the JODC-formatted version of the data inventory file. From this file, data products such as data summaries and location plots of observations are provided to users, as well as to the IOC and WMO.

### RNODC/IGOSS - Russia

The RNODC/IGOSS-Russia and SOC for IGOSS data was established in 1984 under the auspices of the Russian Scientific Research Center for Hydrometeorological Information and the Russian Hydrometeorological Scientific Research Center (Russian Hydrometcenter). The responsibilities of the RNODC/IGOSS include the collection of BATHY/TESAC messages and logs, quality control of the data, preparation of data sets on magnetic tape, and the development of products concerning availability and time-space data distribution. The RNODC/IGOSS also provides national and international users with copies of data, results of analyses, and with other products for its area of responsibility.

The responsibilities of the SOC include preparation, publication, and distribution of different types of operational oceanographic products on a regular basis including those distributed via FAX machines that are readily available to different groups of users.

These activities are carried out in accordance with the procedures spelled out in the IOC's Guide to Operational Procedures for the Collection and Exchange of Oceanographic Data (BATHY and TESAC), 1985 and the Guide to the IGOSS Data Processing and Services System, 1983.



## RNODC/IGOSS - U.S.

The RNODC/IGOSS-U.S., located at the National Oceanographic Data Center (NODC), receives near real-time data weekly from the Ocean Products Center at Suitland, Maryland and the Ocean Applications Group in Monterey, California. These data are extracted from the Global Telecommunications System (GTS) on a daily basis for screening and editing. At the RNODC, the near real-time data sent by the two organizations are run through a series of programs to convert the data into NODC's Universal Bathythermograph (UBT) format. This data set is next sorted by date, time, position, and an indicator of the source of the data. The sorted file is then compared with existing observations and duplicates are eliminated.

The records retained are then sorted by reference number, date, and time to produce a cruise-ordered data set. From this final data set, inventory records are created. These data are then merged into the RNODC/IGOSS Archive. The Archive is updated on a monthly basis in geographical sequence.

Data in the U.S. RNODC/IGOSS Archive are then available for international exchange and can be provided to users in a variety of forms ranging from standard media copies to computer-generated data summaries, statistical analyses, and graphic plots.

## Availability of IGOSS Data and Products through WDC A, Oceanography

Various RNODC/IGOSS data, analyses, and products are available through WDC-A, Oceanography. Upon request, WDC-A will provide copies of pertinent data products, or, alternatively, refer the requester to the appropriate IGOSS data source.

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## **GLOBAL TEMPERATURE - SALINITY PROGRAM**

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### **INTRODUCTION**

Making ocean temperature and salinity data quickly and easily accessible to users is the primary goal of the Global Temperature - Salinity Program (GTSP). A cooperative international program, the GTSP has now developed a global ocean T-S data base comprised of data that are as up-to-date and of the highest quality possible. Numerous IODE countries are now contributing to the program.

### **U.S. PARTICIPATION**

The U.S. supports the GTSP through the participation of its National Oceanographic Data Center (NODC). NODC fulfills several functions in support of the GTSP:

- 1. Data communications support.** The Internet is used daily to transmit and receive data and project information. Real-time data are relayed from NOAA's National Weather Service and the Navy's Fleet Numerical Oceanography Center to Canada's Marine Environmental Data Service (MEDS). In addition, monthly fliers are transmitted to oceanography centers in Hobart, Australia; Brest, France; La Jolla, California; Miami, Florida; and other locations in the United States.
- 2. Data quality control.** All GTSP data are passed through standard data quality tests, which are documented in the GTSP Real-Time Quality Control Manual (Intergovernmental Oceanographic Commission Manuals and Guides No. 22, UNESCO, 1990). NODC has implemented two systems to apply quality tests to data destined for the GTSP database. The systems operate on UNIX-based workstations that are part of NODC's client/server computing environment. One system displays geographical positions of observations as compared to land masses, and shows ship speed between observations as a check on positions dates and times. The second system applies tests to subsurface temperature and salinity data, setting flags to reflect test results.
- 3. Database maintenance.** GTSP data are maintained in a relational database that is managed by commercial software on the UNIX workstation. Real-time data are added automatically, as they arrive from MEDS. Higher quality delayed mode data are also being quality controlled and added to the data base. As these observations are added, the matching real-time data are tagged to avoid sending two copies of the same data. The

database makes it possible to quickly load and retrieve data, as well as to provide statistics about the number of observations per geographic region, time period, ship, or data type.

## **GTSP DATA**

Data in the GTSP database are generated by ships or buoys from all regions of the world's oceans. Instruments used to collect the data include thermistor chains (on buoys), XBTs, digital bathythermographs (DBTs), bottle samplers, and CTDs. The data are sent in real-time (by radio or satellite transmission) and later in delayed mode when ships return to port.

Delayed-mode records are generally of higher resolution than records sent in real time. Therefore, NODC acquires delayed mode data (usually several months after data were collected) and merges them into the database. To avoid duplication of real-time and delayed mode observations, real-time records are matched to corresponding delayed mode records in the database. In that way, the GTSP data resource is built quickly from real-time records and subsequently enhanced by high quality, high resolution delayed mode records.

## **SUPPORT TO CLIMATE RESEARCH**

NODC continues to provide monthly files of real-time data to WOCE Upper Ocean Thermal science centers in France, Australia, and the U.S.; each of these centers uses the data in ocean climate research. Results of their scientific analyses are fed back into the GTSP database to enhance data quality. Also, in support of WOCE, NODC now produces reports of the distribution of data along TOGA-WOCE-IGOSS transect lines.

GTSP has demonstrated the feasibility of a global ocean network of data management and science centers. The project has shown that computer technology and networks, now in place, are sufficient for sustaining cooperative work such as that being done in GTSP. Experience gained from GTSP will be useful to future global ocean data management projects, such as the Global Ocean Observing System (GOOS).

To obtain information about the availability of data from the GTSP Data Base, as well as participation in the Program itself, please contact the following:

National Oceanographic Data Center  
NOAA/NESDIS E/OC13  
Silver Spring, MD 20910-3282 U.S.A.

Email: [mhamilton@nodc.noaa.gov](mailto:mhamilton@nodc.noaa.gov)

World Data Center A, Oceanography  
NOAA  
Silver Spring, MD 20910-3282 U.S.A.

Email: [wdca@nodc.noaa.gov](mailto:wdca@nodc.noaa.gov)



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## REPORT OF OBSERVATIONS/SAMPLES COLLECTED BY OCEANOGRAPHIC PROGRAMS

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International marine data inventories, particularly the Reports of Observations/Samples Collected by Oceanographic Programs (ROSCOPs 1 and 2) and their successor, the Cruise Summary Report (ROSCOP 3), have played a significant role in the success of IODE data exchange and data management for more than 20 years. In addition to their stated purpose of providing a means for determining the availability of internationally exchangeable data in advance of its actual receipt, these inventories have also: (1) provided referral service to data not routinely exchanged through the WDC system and (2) supplied important documentation in support of processing by national and regional data centers.

The ROSCOP scheme was initially approved by IODE at its Fifth Session in 1970 as an interim marine data inventory, and the first ROSCOP 1 forms were received by WDC-A in 1971. A completely revised version (ROSCOP 2) was developed by the Task Team on Inventories of Marine Data and Samples, and was accepted by IODE at its Seventh Session in 1973; ROSCOP 2 forms were first received during 1974. Subsequently, in consideration of new requirements identified by IODE, the form was completely redesigned in 1989; the resulting Cruise Summary Report (also subtitled ROSCOP 3 for purposes of continuity), which was intended to be more user-friendly, was approved by IODE in 1990.

Through the end of 1997, WDC-A had received and tabulated a total of 22,817 ROSCOP forms of all types (ROSCOPs 1, 2 and 3) for the twenty-year period. A general decline in numbers of forms received from the first half of the period to the last half is evident. Certain factors have obviously had a significant impact on the receipt of ROSCOP forms: (1) the occurrence of special projects of limited duration (such as the U.S. OCSEAP Program in the 1970s) that generated large numbers of ROSCOPs; (2) a possible overall decrease in many countries' national marine science programs; and (3) significant periods of policy changes or disruptions that impact a Data Center's activities.

In evaluating the long-term success of the ROSCOP program, it is important to recognize the valuable contribution made by ICES in developing the automated system that facilitates utilization of information received on the ROSCOP forms. The automated ICES system is in use at WDC-A; however, it must be noted that there may be discrepancies between WDC-A's ROSCOP tabulations and the ICES system, because the inclusion of all ICES-held ROSCOPs in WDC-A's tabulations has not yet been verified. Additionally, it is believed that WDC-A may hold some historical ROSCOPs that are not included in the ICES system. A task is now underway in WDC-A to ensure the inclusion of all available ROSCOPs in both Centers' holdings.

Number of ROSCOP forms and Cruise Summary Report forms received by  
WDC-A, Oceanography, as of 31 December 1997

Country	ROSCOP 1 Forms	ROSCOP 2 Forms	Cruise Summary Reports
Argentina	1	158	19
Australia	--	89	--
Belgium	15	13	--
Brazil	--	106	21
Canada	63	315	38
Chile	--	1	--
Colombia	9	--	--
Denmark	41	223	--
Ecuador	6	--	--
Finland	27	107	--
France	100	2,335	307
Germany	513	1,746	1,434
Ghana	--	2	--
Iceland	39	122	--
India	32	8	--
Indonesia	--	--	2
Ireland	12	43	--
Italy	3	--	--
Japan	214	1,638	212
Netherlands	78	295	11
Norway	108	404	--
Peru	3	--	--
Poland	82	100	--
Portugal	--	1	--
Spain	35	15	--
Sweden	38	203	--
South Africa	--	477	--
Russia	85	393	--
United Kingdom	614	2,412	514
United States	20	6,303	254
Korea (Republic of)	8	58	272
Congo (People's Rep.)	16	1	--
Senegal	1	--	--
Mauritania	2	--	--
<b>Totals</b>	<b>2,165</b>	<b>17,568</b>	<b>3,084</b>

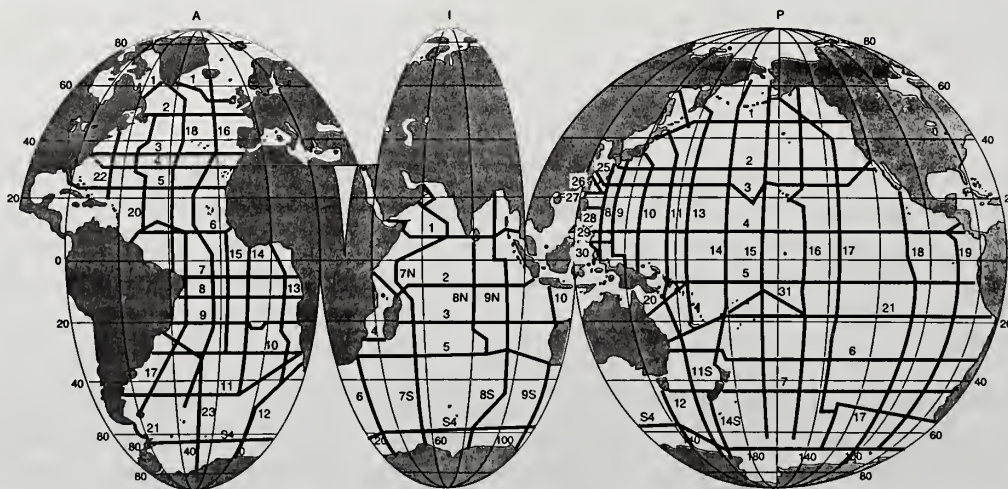
## WORLD OCEAN CIRCULATION EXPERIMENT

### BACKGROUND

The World Ocean Circulation Experiment (WOCE) is a component of the World Climate Research Program that seeks to investigate the role played by ocean circulation in the earth's climate system. Its goal is to develop improved ocean circulation models for use in climate prediction. The WOCE observational phase (1990-1997) has used satellites and in-situ physical/ chemical measurements taken during this largest and most comprehensive ocean observational program undertaken to date, in compiling a quasi-synoptic data set of unprecedented scope.

### DATA MANAGEMENT

The WOCE Hydrographic Program (WHP) is comprised of One-Time Surveys, Repeat Hydrography, and Bathymetry data taken along WOCE tracks. The One-Time Survey encompasses a range of physical and chemical measurements at discrete stations and from continuous sampling. Repeat Hydrography sections and time-series stations provide information on the temporal variability of the ocean in different seasons and years. The WHP Special Analysis Center represents the final stage in the hydrographic data management process, providing a globally-consistent data set and generating dynamical data products. Direct Current Measurements include data from Current Meter Moorings, Subsurface Floats, Surface Drifting Buoys, and Acoustic Doppler Current Profilers (ADCPs). WOCE Upper Ocean and Sea Surface Observations consist of Upper Ocean Thermal Data, Sea Surface Salinity, and Surface Meteorological Data and Surface Fluxes. Upper Ocean Thermal measurements are taken with XBTs, moored buoys, thermistor chains, profiling floats, and CTDs.



*The WOCE One-Time Hydrographic Survey*

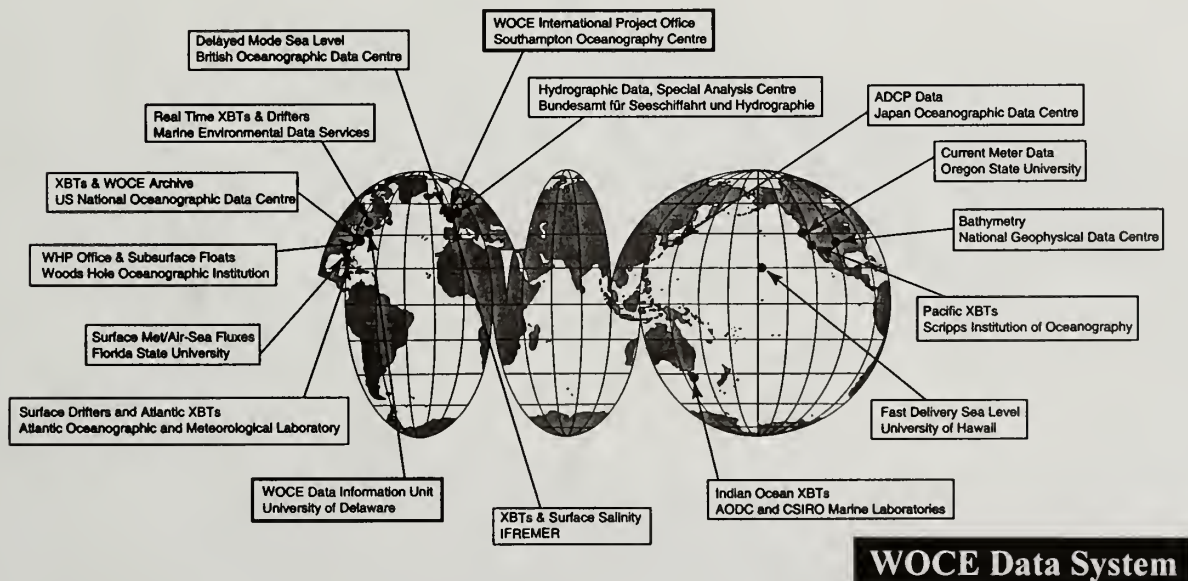


The unusually wide variety of data types observed during WOCE has required a somewhat different approach to data management than was employed during previous international ocean surveys. The WOCE data management structure consists of the following elements:

Data Assembly Centers (DACs) are managed by scientists, handle assembly and quality control of data sets, and generate data products.

Special Analysis Centers (SACs) perform data analysis and synthesis functions, including the generation of derived data sets.

Data Information Unit (DIU) is a central source of information on the status of WOCE, tracking all data collection, processing, and archiving activities, and acting as the primary interface between the WOCE data system and its users.



## DATA ARCHIVE

WDC-A, Oceanography, with support from the collocated U.S. National Oceanographic Data Center (NODC), will serve on behalf of the WDC system as the final archive for the WOCE Data Set. WDC-A will archive and preserve the non-satellite WOCE Data Set in its entirety. In support of the WDC-A effort, all DACs and SACs have agreed to produce CD-ROMs of their complete data holdings to be disseminated in association with WDC-A.







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